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COMPUTERWORLD

INSIDE

Spotlight — Don't get tied up in knots over LAN hardware decisions. Pullout section follows page 52.

In Depth — Why the Mac will win — or won't. **Page 61.**

'Skins to tame Broncos? Both the mainframe and PC buck the Super Bowl spread, although their methodologies aren't compatible. Page 2.

MAP/TOP adherents ramp up for this summer's coming-out party. Page 15.

Reverse-engineering IDMS/R applications into DB2 applications is now possible, well-heeled start-up claims. Page 101.

MIS professionals pound Wall Street's pavement with mixed success in wake of financial industry retrenchment. Page 8.

Mac to VAX and everything else is promised in tools being announced this week by Apple and third-party vendors. Page 16.

Breathing the air of DEC's strategy leaves analysts groping for products. Page 4.

PS/2 clone tools unveiled, but no systems vendor has yet declared willingness to test IBM's legal intentions. Page 14.

Management grad, 31, runs up MIS ladder to grab executive rung. Page 67.

NEWSPAPER
SECOND CLASS

Criticism builds as 9370 deliveries lag

BY ROSEMARY HAMILTON
and STANLEY GIBSON
CW STAFF

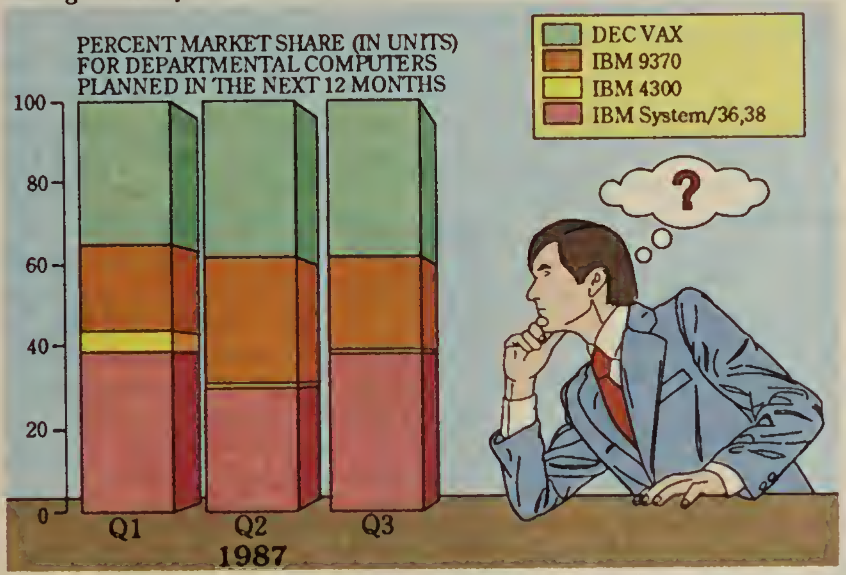
IBM painted an optimistic picture last week of its 9370 series, challenging the growing perception that the company's mid-range line remains an unfulfilled promise.

Nevertheless, a cloud continued to grow over the 9370 as the company acknowledged that its 1987 shipments had fallen short of the announced goal of 5,000 processors.

Analysts cited a lack of 9370-specific applications software, missing connectivity software and mixed messages from IBM on its mid-range direction as reasons for missing the shipment goal. But IBM said it failed to hit the delivery target because it was unable to ramp up production to meet demand.

Mid-range muddle

Survey of buying intentions at U.S. IBM and compatible mainframe sites indicates some confusion about IBM's mid-range strategy, which is having little impact on DEC's VAX



INFORMATION PROVIDED BY FOCUS RESEARCH SYSTEMS
CW CHART: FRANK C. O'CONNELL

Dropping VAX killer image

IBM now appears to be backing away from the "VAX killer" image that it tacitly promoted for the 9370.

"There has been a lot of misunderstanding of the 9370. It was announced for IBM 370 users as a distributed processor," said Larry Ford, assistant group executive for mid-range systems, explaining that the 9370 was intended for areas in which 370 skills and programming were already in place.

Once large customers develop customized applications for their corporations, they will order 9370s in large numbers, Ford said, claiming that some 500 large IBM customers are now working on their own 9370 applications.

Just fine for some

Some users who have recently installed 9370s said the system has met their expectations.

Peter Diaz, MIS manager at Minico, Inc. in Phoenix, said he received a custom-configured Model 60 Oct. 15. He said he is in the process of automating Minico's insurance and mini-storage businesses on the system and will be using IBM's VSE operating system. Eventually, he said, he plans to connect 15 IBM Personal Computer XTs and PC ATs and 40 IBM 3270 terminals to the system.

Diaz said he was attracted to the 9370 because of its compatibility with IBM's 4381 and 3090 mainframes, to which he may wish to migrate in the future. He also said some applications modules available for the 9370 were

Continued on page 6

IBM coding AI strategy

BY CHARLES BABCOCK
CW STAFF

RYE BROOK, N.Y. — IBM is aggressively promoting artificial intelligence for upgrading standard applications in central MIS shops and intends to make it easy for third-party vendors to move their products onto IBM platforms, according to company executives.

To increase the use of AI on its machines, IBM is developing what it calls a knowledge processing architecture. It will allow third-party developers of expert system shells to move their products onto standard IBM hardware platforms, including

Continued on page 14

Server deal shuffles data base deck

BY ALAN J. RYAN
and STEPHEN JONES
CW STAFF

Users last week hailed the announcement of a potentially standard-setting data base engine for local-area networks, but analysts said that by signing on to the technology, data base management system kingpin Ashton-Tate Corp. may have mortgaged away its dominant share of that market.

SQL Server, which is slated to ship in the second half of this year, is based primarily on technology from Sybase, Inc. It will be licensed by Microsoft Corp., which, in turn, has licensed Ashton-Tate to sell the product in retail channels. Ashton-Tate has also pledged to support SQL Server in a new release of its Dbase.

However, the value of a retail contract is questionable in a market in which only 30% of LAN software sales are handled through retail channels, according to Thomas White, president and chairman of Santa Clara, Calif.-based consulting firm Infonetics, Inc.

The server will run on Intel Corp.'s 80286 and 80386 microprocessors. It reportedly harnesses the power of IBM and Microsoft's OS/2 operating system and a set of large system utilities to perform tasks that previously required the computing power of a minicomputer or mainframe. Among other benefits, users will be able to simultaneously access the network server with multiple personal computer programs.

Continued on page 100

Oil firm sees gusher in MIS

BY JEAN S. BOZMAN
CW STAFF

HOUSTON — While most oil companies hunkered down for lean times as prices plummeted during recent years, Pennzoil Co. invested $50 million in information systems. That project, initially designed to make the oil company's operations more efficient, last month resulted in the birth of a subsidiary that plans to sell industry-specific applications.

Patrick L. Manning, president of Pennzoil's Strategic Information Services Co. subsidiary, last week detailed plans to establish a profit center from the firm's former MIS operation. Manning said the goal is to gain market share, while others in the oil industry scramble to revamp

Continued on page 10

Patrick L. Manning

IN THIS ISSUE

Profitable partnership. The Prime-Cydrome alliance bears fruit in the form of a data flow parallel processor intended for scientific, engineering and financial applications. Page 5.

Building bridges. Ungermann-Bass launches Access/One, a protocol-independent enterprisewide networking system to connect departments and buildings that have been wired together. Page 6.

NEWS

4 DEC's desk top strategy has potential, industry sources say.

4 Landmann named president of CW Publishing.

4 Manufacturers Hanover survives 'quiet disaster.'

6 IBM's fourth-quarter results show improvement.

8 Hutton professionals join Wall Street layoff crew.

8 Sterling plans management buy-out.

8 Wordperfect upgrade to ship in March.

10 Pennzoil sidestepped 9370, DB2 in redesign effort.

14 Chips and Technologies provides the latest in clone ware.

14 Information Builders rumored to be near close of development deal with HP.

15 Groups detail events of June networking conference.

15 Some call MAP/TOP specification elementary.

16 Apple unveils support for SNA.

16 Apple caters to MIS with series of development tools for the Mac.

16 Firm develops language to link VAX, Mac.

100 Stratus announces pair of processors.

100 Comdisco arbitrage withdrawal nets $80M loss.

100 Prime, Computervision continue legal fencing.

101 Start-up offers IDMS/R development system.

101 Ashton-Tate upgrades Rapidfile.

101 AT&T agrees to meet with angry suppliers regarding Sun acquisition.

101 Concurrent extends supermini family downward.

SOFTWARE & SERVICES

25 Users want SNA support before VM/XA SP.

25 NASD offers PC-compatible workstations, software to members.

25 U.S., British vendors combine support systems.

Can Macintosh cut the PC out of the market? Page 61.

MICROCOMPUTING

35 Oracle revs up engine for 1-2-3.

35 Lotus rewrites Manuscript for general-business use.

NETWORKING

45 3Com file server checks in to users' raves.

45 Netlink's SNA Hub now works in concert with Cincom's Netmaster.

SYSTEMS & PERIPHERALS

55 Convex, Alliant prep processors for March shipments.

55 New Guide president seeks IBM partnership.

55 Apollo to leapfrog Sun with 20-MIPS system, firm says.

Quotable

"Pennzoil's top executives were involved on an ongoing basis for the entire four-year project. The thrust has to come from top management in order to make an information plan part of the overall strategic plan for the business."

PATRICK MANNING
STRATEGIC
INFORMATION
SERVICES CO.

See story page 1.

MANAGEMENT

67 Liberty Mutual strategist on the systems fast track.

67 Blue-chippers join MIT to peer into the '90s.

67 MIS goes to market; Lotus names VP.

COMPUTER INDUSTRY

75 Most vendors able to walk away from the crash.

75 How Austin, Texas, roped Sematech.

75 Migent CEO quits as firm's woes mount.

COMPUTER CAREERS

81 Firms pursuing LAN managers.

TRENDS

102 Some look to gateways for 3270 emulation.

SPOTLIGHT

LANs are becoming too large for companies to continue letting them grow wild. **Follows page 52.**

IN DEPTH

61 Pro/con: Does the Macintosh have what it takes? A DPer says "Absolutely"; an analyst says "No way."

OPINION & ANALYSIS

19 Karten sees future generations knee-deep in data.

25 Babcock wants to settle shifting standards.

35 Scannell follows Compaq down the price cutting trail.

45 Leong disdains designer labels.

55 Connolly wonders if DEC's grow-it-at-home approach will bear fruit.

67 Ludlum takes job as end-user manager — and gets canned.

75 Keefe peers into DEC's future.

DEPARTMENTS

18 Editorial

22 Book Reviews

92 Marketplace

102 Inside Lines

High-tech consensus: Broncos to get sacked

BY BRUCE HOARD
SPECIAL TO CW

At long last, a battle between micros and mainframes that is meaningful to the common betting man.

In the Super Bowl XXII matchup, the IBM 4341 favors the Washington Redskins by 1½ points over the Denver Broncos, while the IBM Personal Computer and clones are picking the Redskins by 3½.

Backing the 4341 is long-time *Computerworld* forecaster and former press agent to the stars, Bud Goode. On the IBM PC side is the up-and-coming star of radio and tout sheets, Mike Orkin.

Goode still relies on his Fortran-based 173 variables and regression analysis. He still sells his weekly readout to seven National Football League coaches and to CBS analyst Dick Vermeil. He looks at the games in terms of yards per pass attempt and yards allowed per run.

Goode, who picks professional games against the spread in *The New York Post*, has a straightforward football philosophy. "I like the running game on offense, and I like the team that can stop the run on defense. That's the nature of the game. It's a collision sport," he says.

'Micro statistics'

Orkin is backing his floppy disk data base, Pro Football Pointspread Analyzer. He disdains what he calls Goode's "micro statistics," depending instead on such arcane factors as how teams with natural-grass home fields do on artificial turf and how cold-weather teams do at home against warm-weather teams in November.

He and his partner, Richard Drogin, founded Best Bet Software, which sells Pro Football Pointspread Analyzer. Orkin is also chairman of the statistics department at California State University in Hayward.

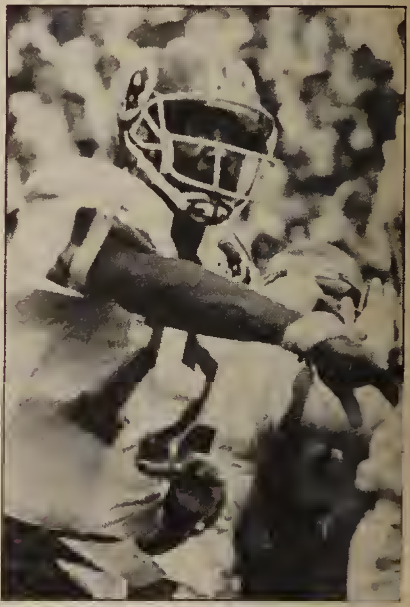
When he is not lecturing at California State, Orkin can be heard prognosticating on radio stations KGO in San Francisco, KGIL in Los Angeles and KDWN in Las Vegas, an appropriate venue for a man with his skills. He also contributes to "The Gold Sheet," a sports information service known colloquially in some quarters as a tout sheet.

"I won't pick a game unless there are a bunch of factors going well for one team, bad for another and the point spread is right," he says. He and Goode are both bucking the Las Vegas line of Broncos by 3½ points.

Goode lauds the aggressive Washington defense, saying, "The 'Skins got fat off the sack this year." For all you unwashed non-sports fans, that means they frequently smashed, bashed or otherwise tackled the opposing quarterback before he could pass the ball.

According to Goode, the Redskins defense averaged 3½ sacks per game. For its part, Denver allowed two sacks per game. If Washington can just beat its average and get four sacks, it is sayonara Broncos, Goode says.

Orkin also focuses on the sack game. "If the 'Skins can blitz Elway, they can win," he observes, citing Denver's quarterback, John Elway. He also points out Denver's tendency to start fast and then stall out in the second half, an occurrence that could prove fatal against Washington, which is noted for its comebacks.



Redskins *quarterback Williams to control Super Bowl?*

"If the game is close at halftime, Denver will have a hard time winning," Orkin says.

Devotee of the ground game that he is, Goode notes the Redskins averaged 4.24 yards per run during the regular season — which places them seventh in the league — while the Broncos surrendered 4.66, a figure that leaves them 27th in a 28-team league.

Looking at it another way, the league average number of running plays vs. passing plays per game is 1-1. According to Goode's statistics, if Washington, behind quarterback Doug Williams, can control the ball running and up that figure to 1½ running plays to every one passing play, it will be worth five points to them.

Then Denver would have to pass more, an imperative that Goode says could prove fatal to the team and Elway, its star quarterback. "If Elway throws two interceptions, his chances of losing the game are four out of five," he declares.

Hoard is editor of Network World, *an IDG Communications publication.*

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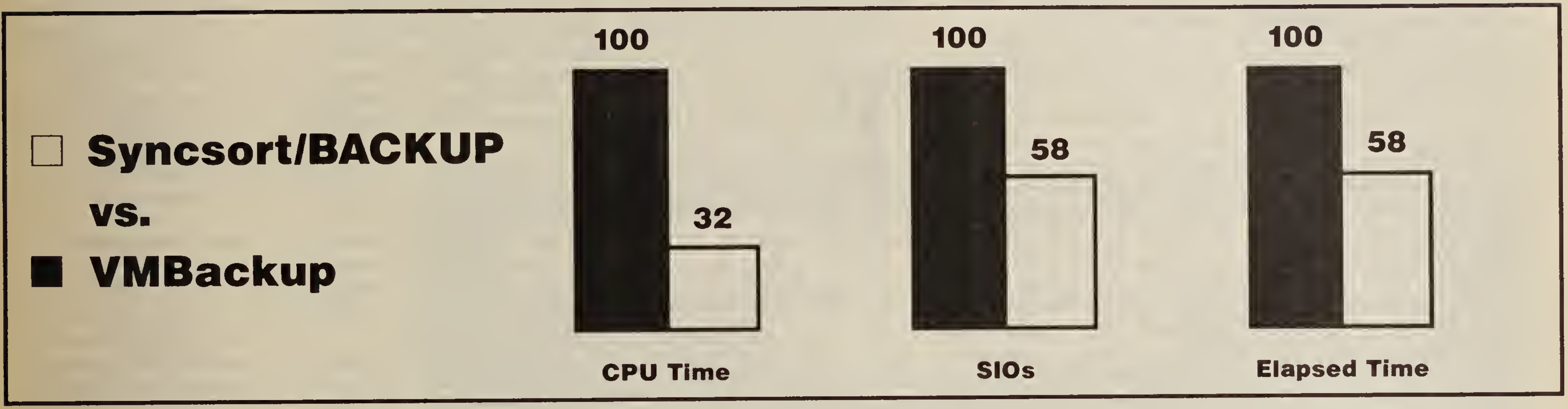

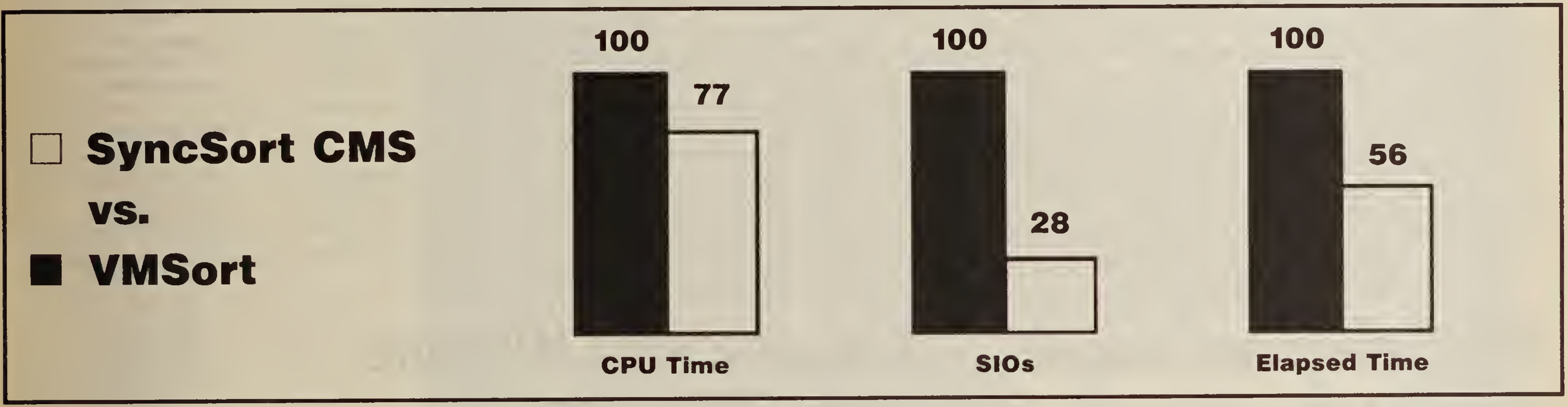

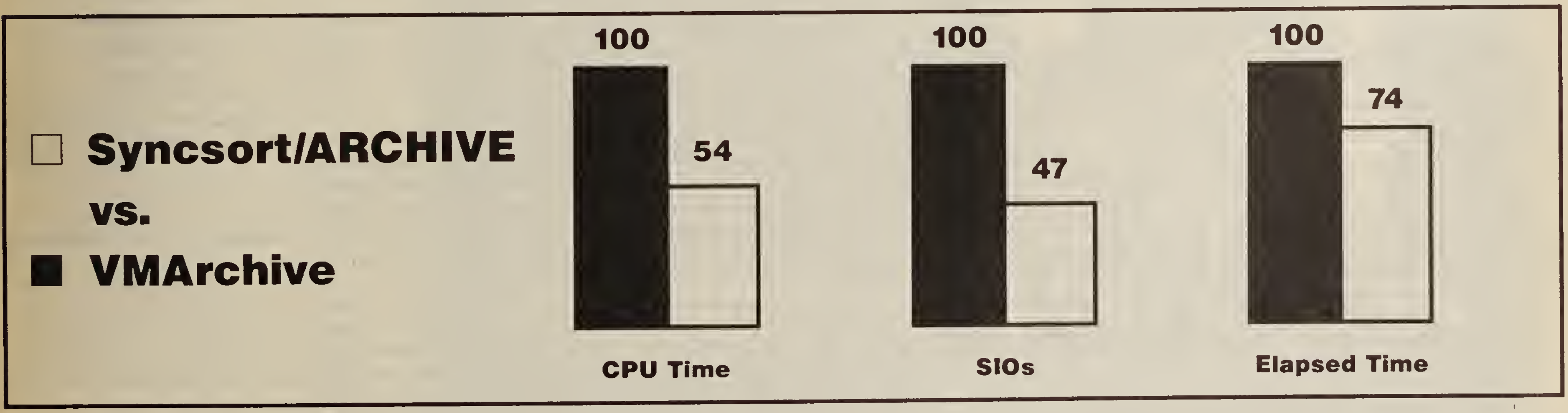

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DEC plugs desktop network strategy

BY STANLEY GIBSON
CW STAFF

BOSTON — Digital Equipment Corp. last week set forth a desktop strategy that it promised will connect Microsoft Corp. MS-DOS, VAX-based Unix and Macintosh systems to DEC VAX/VMS systems.

DEC said it will extend some services of its Decnet/OSI network architecture to IBM OS/2 desktop devices but provided few specifics on how and when that will be accomplished.

DEC also reiterated that it will support Apple Computer, Inc. Macintosh systems at the levels that had been announced four days earlier [CW, Jan. 18].

Significance unclear

Analysts were left puzzled about the significance of the announcement — whether it was intended as a counterblow to IBM's Systems Application Architecture (SAA) or an effort to develop a marketing position.

"It's a marketing positioning announcement, or, less charitably, it's 'Etherware,' " said Marty Gruhn, president of The Sierra Group in Tempe, Ariz.

"This will be important in the future, but don't sell it to me like you have it now," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D. C., referring to DEC's advertising theme, "Digital has it now."

Comparing the DEC announcement with IBM's SAA announcement, made last spring, Dzubeck said, "I think this is a poor second in comparison."

William Strecker, vice-president of product strategy and architecture, said DEC intends to build its network to incorporate the most commonly used single-user operating systems and interfaces. DEC named the strategy Network Applications Support (NAS).

Strecker said the protocols that DEC will support are Data Access Protocol, a Decnet protocol for files since 1975; Microsoft's Server Message Block (SMB); Sun Microsystems, Inc.'s Network File System (NFS); Apple's AFP file sharing protocol; Adobe Systems, Inc.'s Postscript for desktop publishing; Digital Document Interchange Format (DDIF), a DEC internal standard for document processing; and SQL for database use.

However, precisely what links will be forged or when they will be released was left unsaid. The only date given, Aug. 15, was for the availability of Macintosh tools. However, that date was given the previous week, when the DEC-Apple alliance was announced.

"This is a strategic briefing, not a product announcement," Strecker said. "Many of the capabilities will be available soon."

Dzubeck said SAA, which promises the transparent operation of programs across a wide variety of disparate IBM architectures, offers more than DEC's plan, which will offer only networking applications across different machines. "I doubt you will be able to run a VMS application on a Mac. In that sense, it's not as good as SAA," he added.

> "THIS WILL BE important in the future, but don't sell it to me like you have it now."
>
> FRANK DZUBECK
> COMMUNICATIONS NETWORK ARCHITECTS, INC.

Although OS/2 support is part of the NAS plan, DEC made no promises of eventual support of the Presentation Manager component of OS/2 on the grounds that it does not yet exist.

In addition, DEC did not announce support for popular local-area network systems sold by Novell, Inc., 3Com Corp. and Banyan Systems, Inc.

During a press conference, Henry Ancona, DEC's vice-president of business and office information systems, was asked if the company's linkup with Apple is part of a new desktop strategy to replace DEC's previous failures with the Decmate and Rainbow personal computers. "No, not at all," Ancona responded, professing continued faith in the Vaxmate.

"I don't believe they have given up on their own desktop machine. This is a pragmatic business decision until they have a VAX on a desk," Gruhn said. She indicated that DEC executives had told her such a desktop VAX will be coming this year.

However, DEC will offer service to the Macintosh within two months, according to the information distributed to analysts. DEC also announced that it will service the IBM-compatible personal computers of Compaq Computer Corp., Ing C. Olivetti & Co. and Zenith Electronics Corp.

Dzubeck said he believes DEC is working on a "Macmate" that will be a Decnet version of the Macintosh in much the same way that the Vaxmate is a Decnet MS-DOS machine.

Fritz Landmann named *Computerworld* publisher

FRAMINGHAM, Mass. — Frederic H. (Fritz) Landmann has been named president of CW Publishing, Inc. and publisher of *Computerworld.*

Landmann, 54, was formerly group vice-president at International Data Group (IDG), the parent organization of CW Publishing, which publishes CW and *Computerworld Focus.* As group vice-president, Landmann was responsible for three IDG Communications publications: *Federal Computer Week, Digital News* and *CIO.* IDG Communications is a division of IDG.

"I feel most fortunate to have been selected to lead such a team of high-level professionals on the flagship publication of IDG," Landmann said. "It is the ultimate challenge and responsibility within our corporation."

Fritz Landmann

Landmann began his publishing career in 1960 with Chilton Co., where he served as associate publisher of *Food Engineering* magazine until 1968. His career includes assignments as publisher of *Media-Scope* magazine, a Standard Rate & Data Service, Inc. publication; group executive with ITT Publishing; and publisher of Penwell Publishing's *Computer Design.* In 1986, Landmann joined IDG Communications as president and publisher of FCW Publishing, where he started *Federal Computer Week.* In late 1987, he was named IDG group vice-president.

He is a graduate of the Wharton School of Business.

Landmann replaces James S. Povec as president of CW Publishing. Povec has been named IDG Communications group vice-president and president of IDG Publishing Ventures.

Repairs prompt MIS move

Hot site aids Manufacturers Hanover

BY JEAN S. BOZMAN
CW STAFF

NEW YORK — It could have been a disaster. Instead, MIS managers at Manufacturers Hanover Trust Co. packed up their data tapes and moved into a Carlstadt, N.J., hot site while their data processing center was closed for electrical repairs in November.

Perhaps it would not have been a physical disaster, admitted Bob Mianno, vice-president and general manager of Manufacturers Hanover Services Corp., but it would have wreaked havoc on his end-of-the-month accounting operations in lower Manhattan.

Mianno said he had not wanted to disclose the hot-site incident until long after it was over.

"We discovered the problem during a routine infrared scan of our electrical wiring," Mianno said last week of the quiet catastrophe. "The fire marshal came and said we had to close down for repairs to fix some frayed wiring that had created a hot spot."

Manufacturers Hanover was uniquely prepared for the problem, since it has maintained offices next to Comdisco Disaster Recovery Services, Inc.'s hot site in New Jersey for the last four years.

Weekend relocation

After learning of the situation on a Wednesday afternoon, Mianno made plans for 20 of his DP staff members to work during the weekend at the Comdisco hot site.

The switch began at 6 p.m. Friday and lasted until 6 a.m. Sunday. By Sunday evening, the wiring repairs at the New York center were complete, and the data tapes were reinstalled at the Manhattan computer center.

Manufacturers Hanover holds a full-dress disaster recovery rehearsal once every quarter for each of its four New York-area IBM mainframe data centers. Networking facilities between the centers add further redundancy to the disaster recovery plan.

"Manufacturers has gone beyond what most of our customers do," said Ray Hipp, president of Comdisco Disaster Recovery Services. "They have built a network backup facility that is almost foolproof."

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Prime-Cydrome effort to bear first fruit

Positions data flow multiprocessor for scientific, engineering, finance fields

BY JAMES CONNOLLY
CW STAFF

The alliance between general-purpose systems vendor Prime Computer, Inc. and start-up minisupercomputer maker Cydrome, Inc. — one of the few such relationships — is set to result in the introduction of a data flow parallel processor today.

What Cydrome calls the Cydra 5 and Prime relabels as the MXCL 5 was described in briefings last week. The move pits the vendors against two established players at the high end of the minisupercomputer market, Convex Computer Corp. and Alliant Computer Systems Corp.

While Cydrome claimed twice the performance of Convex's and Alliant's products, those vendors report they will boost their performances with new systems in March (see story page 55).

The Cydra 5 is intended for scientific, engineering and high-performance financial applications. It was scheduled for announcement in June 1987 but was delayed by the execution of the agreement, according to Cydrome President Andre O. Schwager, and by performance problems, according to one analyst.

Prime, which owns less than 20% of Cydrome, will offer the MXCL 5 to its user base, to new users domestically in the financial and manufacturing sectors and to new overseas accounts. Cydrome will focus on the rest of the U.S. market, including the education, government and utilities sectors.

Analysts noted that Prime and Gould, Inc., which last year supplemented its real-time computer line with a minisupercomputer, are the only U.S. vendors to include minisupercomputers in a broad product line.

'Bringing validity to the market'

"This is the highest performing departmental supercomputer in the industry," Schwager claimed. "We are bringing an established computer company into the market and, therefore, bringing validity to that market."

Gerald V. Butler, Prime vice-president of engineering and scientific products, said Prime chose Cydrome as a partner because of Cydrome's full systems approach. He noted that the Cydra 5 can act as a stand-alone system and that it is strong in scalar and vector processing.

Butler said Prime is also announcing its Pshell and MXlink software, which allows users of Prime 50 series minicomputers to use Prime Primos commands when logged on to the Unix-based MXCL 5.

The Cydra 5 is a multiprocessor that uses data flow technology. The system examines a program the way a systems analyst would look at a flowchart and identifies code that can run in parallel, Schwager said. He added that the Cydra 5 offers an advantage over vector processors because it schedules conditional branches but avoids making predictions for those branches, a practice attempted by some minisupercomputers.

The centralized numeric processor features fine-grain parallelism and a 40-nsec cycle time. Cydrome said 56 operations can run at a time.

The system also includes up to six interactive processors that run coarse-grain parallel processing. Those 32-bit processors handle operating system execution, I/O management and compilation.

The memory subsystem supports 256M bytes of main memory for the numeric processor and 64M bytes of support memory for the interactive processors. Each interactive processor can withstand a sustained transfer rate of 40M byte/sec., according to the vendors.

Schwager said the Cydra 5 was tested at 10 million floating-point operations per second (MFLOPS) with the Linpack benchmark and ran the Livermore Loops benchmark with a harmonic mean of 3.7 MFLOPS. He claimed the Cydra 5 ran 2½ to 3 times faster than a Convex C1 on the Fluid Dynamics, Inc. Fidap benchmark.

Analyst Jeffry Canin of investment firm Hambrecht & Quist, Inc. in San Francisco said the promise of higher percentages of realizable performance is of growing interest to users tired of hearing vendors quote unreachable performance figures. He said the alliance is of greater benefit to Cydrome than to Prime.

"It is a very crowded market out there for a company like Cydrome, which, while it isn't too late by its own plan, is kind of late in relation to companies like Alliant and Convex," Canin said.

Analyst Gregory Kosinski of the San Jose, Calif.-based market research firm Dataquest, Inc., said the Cydra 5 is a good performer but fairly expensive. Kosinski added that Cydrome still has to prove the performance of the Cydra 5 and its ability to protect users from having to optimize code on real applications.

The system is available in two models, which differ in the amount and type of memory available. An entry-level Model 1201 system costs $579,000 with 8M bytes of main memory. A Model 1401 with 64M bytes of main memory costs $774,000.

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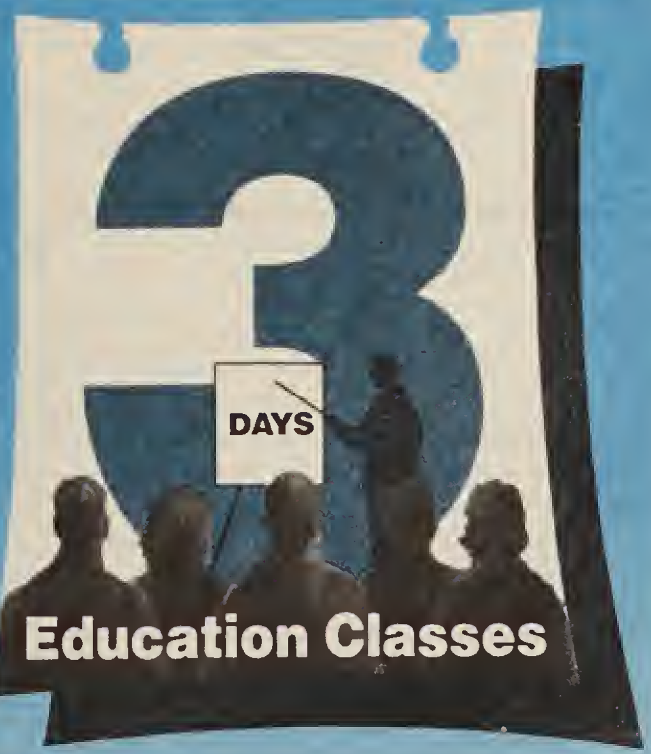

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IBM fourth-quarter triumph tempered

BY CLINTON WILDER
CW STAFF

ARMONK, N.Y. — IBM's critical fourth-quarter financial performance played to mixed reviews last week, as a 50% gain in year-to-year profits was mitigated by favorable nonoperational factors such as tax and currency rates.

Although IBM was able to snap its two-year losing streak with full-year earnings 10% higher than in its disastrous 1986, Wall Street chose to concentrate on IBM's less than robust revenue growth. Sales for both the fourth quarter and the year advanced roughly 6%, but 1987 revenue of $54.22 billion was slightly below 1986's $51.25 billion after subtracting favorable currency translations.

While heavy selling of IBM stock helped drive down the entire stock market all week, some analysts said that their colleagues and the investment community had overreacted. "It's always easier to blame the company than to blame your own earnings forecast," said David Wu of S. G. Warburg & Co. "IBM was supposed to be the big recovery hero but became the villain because its comeback wasn't strong enough."

Expenses pared down

Nonetheless, IBM appears to have restored positive earnings momentum, thanks in large part to its well-publicized cost cutting program. Fourth-quarter operating income was up 23% from the weak fourth quarter of 1986 as the firm held its expenses to a tiny 3% rise from the year-earlier period.

Total fourth-quarter profits were $2.08 billion, or $3.47 per share, compared with $1.39 billion, or $2.28 per share, a year earlier. Revenue was $18.01 billion, up from $16.94 billion in the final quarter of 1986.

Full-year earnings were $5.26 billion, or $8.72 per share, up from $4.79 billion, or $7.81 per share, a year earlier. Although IBM's profits were higher than in 1986 and 1985, they were still less than earnings of 1984 ($6.58 billion) and 1983 ($5.48 billion).

"They have some obvious problems to fix, but the long-term outlook is not gloomy at all," said Bob Grandhi of Interstate Securities Corp. "Given the diverse customer base and the cost of systems migration for those customers, their recovery time has been reasonable."

Most observers focused on IBM's ongoing difficulty growing its mid-range business, particularly sales of the 9370 (see story page 1). Annex Research President Bob Djurdjevic said IBM fell $600 million below his firm's 1987 revenue projection because of the 9370 shortfall.

Warburg's Wu said IBM's eroded mid-range market share has affected mainframe customers' perceptions as well, helping high-end competitors such as Amdahl Corp. Amdahl reported its fourth straight quarter of strong earnings and revenue gains last week, fueling a more than threefold jump in yearly profits to $146 million on revenue that grew 56% to $1.50 billion.

Unit shipments of the IBM 3090 series did increase slightly from 1986 levels, Djurdjevic said. But as IBM nears the end of the 3090's mainframe life cycle, it will need much more growth in minicomputer shipments in 1988 — despite the 3090 F enhancements expected to be introduced in the next few weeks.

"The new models will help, but let's face it, this is a 3-year-old machine," Djurdjevic said. "The mainframe market will be a ho-hummer this year. The growth will come in the mid-range."

Software sales will also be critical, but IBM is coming off a fourth quarter in which software revenue soared 29% to $2.28 billion. For the year, software accounted for 12.6% of total revenue, or $6.83 billion, 24% above 1986 levels.

Other side of the valley

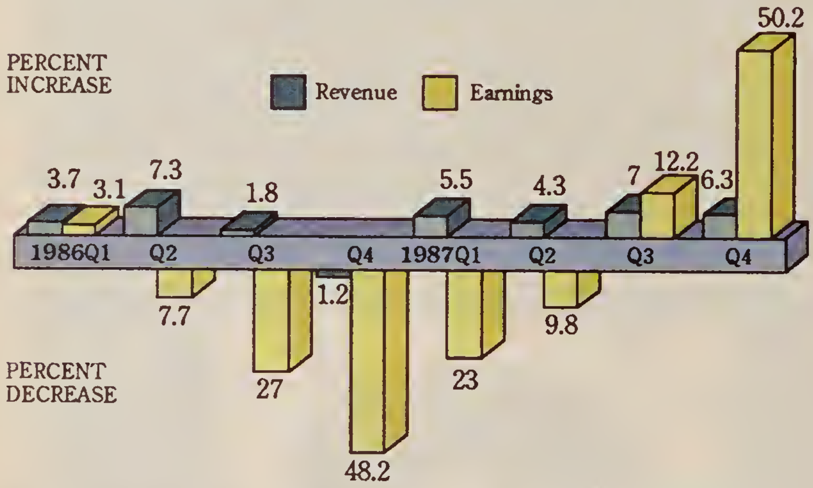
With a strong finish to 1987, IBM begins climb to regain its profitable pinnacle of 1984

	1984	'85	'86	'87
Revenue (in billions)				
Equipment sales	$29.7	$34.4	$34.2	$36.3
Services	$5.2	$6.1	$7.4	$7.7
Software	$3.2	$4.1	$5.5	$6.8
Rentals	$7.7	$5.4	$4	$3.3
Other	$140M	$50M	$150M	$120M
Total	**$45.94**	**$50.05**	**$51.25**	**$54.22**
Profits (in billions)	**$6.58**	**$6.55**	**$4.79**	**$5.26**

INFORMATION PROVIDED BY IBM
CW CHART

Earnings plus

IBM's profits climbed back into the growth category, although analysts said the fourth-quarter boom resulted more from nonoperational factors than from actual performance



INFORMATION PROVIDED BY IBM

9370

FROM PAGE 1

unavailable on competing minicomputers.

But industry observers maintained that the mid-range system has yet to become the networked departmental system at major corporations. In some cases, large companies are still deciding what role the 9370 will play in their organizations.

The Southern Co. in Atlanta reviewed the 9370 and decided to hold off committing to it, according to Mark Turpin, a consultant and analyst for systems integration. Turpin said his company is currently running Digital Equipment Corp. VAXs with All-In-1 office automation software and IBM's Professional Office System (Profs) under IBM's VM at several remote sites.

"We looked at the 9370, but nothing came of it," Turpin said. "We wanted it for the office, but Profs just doesn't do it. It doesn't lend itself very well to it."

Ford said he expects to see wider distributed 9370 use in major firms when many functions that were announced last year, including those for remote operation, become available.

Indeed, the lack of connectivity software topped most analysts' lists of why the mid-range system has not been a big hit.

"You can plug a lot of things into the 9370, but most of the software to utilize those connections still isn't around," said Tom Foth, a software developer at VM Personal Computing, Inc.

Observers said users have been reluctant to embrace the 9370 because there are few applications packages available that have been tailored to the system. Theoretically, any 370 package could run on a 9370. However, many packages would run too slowly on the smaller system or not be suited for a departmental environment.

David Moschella, an analyst with International Data Corp. (IDC) in Framingham, Mass., said IDC estimates that 1987 shipments were in the 3,000 to 4,000 range and that IDC is working on 1988 estimates, which will be in the 6,000 to 8,000 range.

"IBM is having trouble selling the unit. The reason is that IBM has no applications," said Ted Sabarese, president of Ultimate Corp. in East Hanover, N.J., a remarketer of the 9370.

The IBM spokesman responded that the company has listed some 900 applications from software vendors that are priced and available for the system.

Observers said most applications for the 9370 are merely relabeled versions of existing mainframe packages.

"You can't take a mainframe package and shoehorn it into the 9370," said Dean Redfern, vice-president of financial systems at McCormack & Dodge Corp. in Natick, Mass.

Redfern said M&D has run its existing packages on a loaner Model 60 it has been testing, but his company has yet to announce products specifically for the 9370. "It's not clear what users are going to want that machine for," he said.

Analysts also said the 9370 has been a victim of confusing marketing tactics. IBM's entire mid-range strategy will remain unclear until the industry sees just how Silverlake, the expected follow-on for IBM's System/36 and 38 lines, will fit into the scheme. Also, the initial thrust of the 9370 as a so-called user-friendly box may have been off the mark.

Some analysts said the VM operating system, even with the VM/IS easy-to-use configuration, has disappointed many users. "The problem is VM is still a mainframe operating system," Foth said. "People expect it to run software like Lotus's 1-2-3. The VM software community has yet to mature to customers' expectations."

System link launched

BY ALAN ALPER
CW STAFF

NEW YORK — Ungermann-Bass, Inc. last week unveiled a system architecture said to enable disparate local-area networks, asynchronous and IBM 3270 terminals to share files and applications over an enterprisewide network.

Called Access/One, the system provides a platform on which protocols, applications services and network management are run. The system is protocol-independent, supporting Xerox Corp.'s Xerox Network Systems and the Transmission Control Protocol/Internet Protocol. It also provides a migration path for future protocols, such as the International Standards Organization's Open Systems Interconnect model, the company said. Network management and support for IBM's Netview are also provided.

The system utilizes an Ethernet backbone. Data is transmitted at 10M bit/sec. over shielded or unshielded twisted-pair wiring. Developed by Ungermann-Bass and Hewlett-Packard Co., the wiring scheme reduces cabling costs and clutter, the Santa Clara, Calif.-based firm said.

At a press conference here, Ralph Ungermann, president and chief operating officer, said the proliferation of multivendor LANs and departmental processors has created an integration nightmare for MIS managers. Access/One will ease the installation of an integrated network over a uniform architecture, easing integration woes, he said.

Getting wired

The company said the system's modular design enables MIS managers to connect departments and buildings that have been wired together. The manager inserts a card corresponding to the particular communications environment into slots in the main unit, which is located in the wiring closet. This also makes moving equipment around the network easier, according to the vendor.

Six cards — the network interface, supervisor, asynchronous interface, 3270 interface, Ethernet concentrator and Token-Ring Concentrator modules — can be arranged in 11 slots in the system's enclosure.

The main system's enclosure, which fits in a traditional telephone wiring closet, is priced separately, as is each module. An entry-level system costs $10,000 and includes a power-supply enclosure, interface card and two or three communications modules.

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Unemployment line forms at the rear

Wall Street layoffs leave programmers pounding the pavement

BY DAVID A. LUDLUM
CW STAFF

When systems programmers showed up for work at E. F. Hutton & Co. a week before Christmas, they found they could not log on to their computer system.

The blocked access was a precaution taken by Hutton's new owner, Shearson Lehman Brothers, Inc., as a safeguard against disgruntled programmers who would be laid off that day, some of them immediately.

In the five weeks since then, many former Hutton systems professionals have found it difficult searching for work as they joined the swelling ranks of computer professionals laid off by New York securities firms and banks since October — ranks now estimated to number about 14,000.

Shearson is expected to lay off as many as 6,000 employees as a result of its merger with Hutton, which had a work force of 19,000.

Former Hutton systems workers have been dismissed, retained by Shearson or asked to stay on during a transition period that is expected to last through May.

Two former members of a Hutton centralized programming unit say they believe about half of their former colleagues who were laid off have found work.

'Not wonderful'

"So far, it hasn't been wonderful," said Frank Schifano, a $25,000-a-year systems programmer at Hutton until Dec. 19, when he was told he was being laid off that day.

Schifano, 35, got two weeks' pay in lieu of notice, along with two weeks' severance pay for his 11 months with Hutton.

Schifano explained that he is not interested in job offers he has received to do Cobol application programming in other parts of the country, like Cleveland.

With the local market for systems programmers "pretty bad," a job placement agent has suggested he consider returning to the technical support work he had done before joining Hutton. But he does not relish a return to night work.

"I'm not crazy about taking a step backwards, but if I have to, I will. If I don't find something in another month, I will," said Schifano, who is single but noted that living in the New York area "ain't cheap."

Elsewhere, Drexel Burnham Lambert, Inc. — regarded as one of Wall Street's more financially sound concerns — dismissed between 40 and 50 computer systems professionals in November.

Systems employees with poor performance appraisals who might have been helped along in previous years were let go, a Drexel manager said.

Earlier this month, Merrill Lynch & Co. laid off 130 workers at its Somerset, N.J., data center, and observers estimated the firm may soon dismiss 2,000 employees as part of a plan announced last month to slash salary costs by 10%.

The plan also calls for salary and hiring freezes and smaller bonuses, a spokesman said.

The personnel cuts are only the most visible moves made by Wall Street systems departments pulling in their horns in response to the bust of the five-year bull market.

Bears take over

Announcements and reports of major layoffs by New York securities firms since October 1987

OCTOBER	12	•Salomon announces 800 layoffs and closes municipal bond department
	13	•Kidder, Peabody cuts 100 municipal job bonds
	19	•Black Monday: Dow Jones industrials drop 508 points
NOVEMBER	19	•Goldman, Sachs said to be planning up to 400 layoffs
	23	•Drexel Burnham Lambert reported to be laying off up to 200 employees
DECEMBER	3	•Shearson Lehman Brothers buys E. F. Hutton, prompting speculation of up to 6,000 layoffs
	4	•Kidder, Peabody says it will eliminate 1,000 jobs
	7	•L. F. Rothschild announces 700 layoffs
	14	•Merrill Lynch plans 10% cut in salary expenditures
JANUARY	7	•Merrill Lynch reported to be planning 3,000 layoffs

CW CHART

Drexel Burnham Lambert, which aims to hold this year's payroll to the level of last year's, is eliminating contract consultants, setting up a billing system for information services and looking for opportunities to downsize equipment, according to a manager there.

Downsizing could involve greater use of lower speed communications lines and elimination of disk drives, both moves facilitated by disposal of leased equipment, according to the manager.

While not laying off systems workers, Goldman, Sachs & Co., which has laid off 400 other employees, is continuing a 6-month-old program to increase efficiency and effectiveness, according to Rick Adam, the newly appointed partner in charge of technology.

In systems, it includes elimination of consultants in favor of in-house talent, scrutinizing bills more closely and paying greater attention to using the capacity of existing equipment before buying more.

There are positive signs. A Merrill Lynch spokesman said that after the firm laid off data center employees this month, it received numerous inquiries about available workers from companies in the New York region.

But any such inquiries are unlikely to come in the financial services industry.

Head for other industry

Kim Graves is facing the prospect of working in another industry after losing his $45,000-a-year job in capacity management at Hutton's systems department.

Graves, 31, who lives in Manhattan, has been trying to do consulting work but is following the job market in case consulting does not pan out.

"I think it's going to be most difficult in the financial services area," said Graves, adding that he believes the field traditionally falls short in employing capacity managers.

A placement agent told him his prospects might be brighter in retailing.

But with no mortgage or dependents and savings that he considers unusual among his colleagues, Graves says he can afford to be patient.

And sometimes he views the layoff as an opportunity to improve his lot.

"I'm trying to maintain the position that being fired is an opportunity, that I really can do anything," Graves said. "I can go and buy a farm in Vermont if I want, or become a professional scuba diver."

Sterling management coins takeover bid

BY CLINTON WILDER
CW STAFF

DALLAS — Sterling Software, Inc., which broke new ground in acquisition strategy in 1985, last week announced another software industry rarity — the intention to take the company private by mounting a leveraged management buy-out.

The systems software vendor revealed that it has been discussing a buy-out offer in the range of $9 to $10 per share since mid-December. Sterling spokesman Ray Hannon said the management group is expected to announce its tender offer proposal this week. Leading the group are company Chairman Sam Wyly, Vice-Chairman Charles J. Wyly Jr. and President Sterling L. Williams, none of whom were available for comment.

Setting precedents

Sterling shocked the software industry in 1985 with its successful hostile tender offer for much larger Informatics General Corp. Unfriendly takeovers were considered taboo in software because of an expected mass exodus of programming talent from the takeover targets, but most observers said they feel Sterling succeeded in breathing new life into a firm that had become complacent.

Similarly, there are few industry precedents for taking a public software house private via a management buy-out. According to software industry investment bankers Broadview Associates, systems software and services vendor CGA Corp. is the most notable example. Holmdel, N.J.-based CGA was acquired by a management group and an outside investment firm in 1980 and was later sold in pieces to a variety of buyers.

Broadview's Paul Deninger noted that there have been several instances of corporate software division management groups buying their businesses from larger parents and then taking them private. ISI Systems, Inc., a Boston-based vendor of applications and processing services for the insurance market, was sold by Grumman Corp.'s Grumman Data Systems in such a manner.

"Conducting business is easier when it isn't subjected to the kind of reporting required of a public company," Sterling's Hannon said. "Acquisitions and other growth strategies can be done with less cost and less exposure."

Enhanced Wordperfect due in March

BY ALAN J. RYAN
CW STAFF

OREM, Utah — An upgrade to the world's best-selling word processor, currently one million installations strong, will ship on March 21, a Wordperfect Corp. official confirmed last week.

The most significant change in Wordperfect 5.0 is its vastly increased printer support, according to Pete Peterson, executive vice-president. The latest version also includes new style options, a faster graphics-based preview function, a soft keyboard, a program editor, enhanced macros and the ability to merge text and graphics, Peterson said.

In the current Wordperfect version, "the printer drivers were written with letter-quality printers in mind," Peterson said. "But printers have changed drastically over the last three years. Our highest priority [for Release 5.0] was to support basically everything out there — from the small dot matrix printers to laser printers to typesetters."

Wordperfect 5.0 supports multiple fonts in documents, and formatting those documents has been made simpler, according to Peterson.

Fending off encroachers

Peterson said enhancements in Version 5.0 are intended to prevent encroachment on the company's market share, which is estimated at more than 40%.

"Microsoft [Corp.'s] competitive advantage over us has been in laser printing and its style sheets. With Wordperfect 5.0, we think we will have better printing than anybody else, and we're also including what we call styles."

Styles give users the ability to format documents for consistency or to make global changes.

Wordperfect 5.0's soft keyboard allows users to customize function keys. The graphics-based preview function adds the ability to view documents prior to printing them.

Peterson said a Wordperfect version for the Apple Computer, Inc. Macintosh is currently in beta testing, and a Unix product is due in March. These will fit into the current product line of IBM Personal Computers and compatibles, Commodore Business Machines, Inc.'s Amiga, Atari Corp. machines and Apple II versions.

Wordperfect 5.0 is set to sell for $495. The upgrade cost for current users will be $50 prior to Feb. 29 and $60 after March 1.

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DB2, 9370 lost out on big oil strike

HOUSTON — A four-year effort to redesign Pennzoil Co.'s software applications and voice/data network was based on key IBM products, but Pennzoil planners sidestepped two other IBM offerings: the 9370 processor and the DB2 data base management system.

"We are not driven by technology alone," said Al Abbott, director of information networks at Pennzoil. "We take advantage of technology as it fits our needs. But we are management-driven rather than technology-driven."

For the moment, Pennzoil would rather use IBM Personal Computer-based departmental systems than the stand-alone 9370. In part, Abbott said, the reason is that Pennzoil just spent several years trying to remove stand-alone departmental computers, including the IBM 8100.

In the absence of the IBM 9370, distributed IBM 3274 cluster controllers (see chart above) send mainframe data to remote local-area networks. Pennzoil's two IBM 3084Q mainframes run MVS/XA. IBM's TSO system utility supports queries at Pennzoil's information center while a CICS utility runs transaction programs.

Sticking with Adabas

In the area of data base management, Pennzoil has decided to stick with Software AG of North America, Inc.'s Adabas, first chosen in 1978 for its flexibility and ease of use. Data can be presented as relational or indexed files, said Ronald Martin, director of MIS and user support services at Pennzoil.

When DB2 came along in 1985, Pennzoil managers saw no need to move away from Adabas, Martin said. "We took a good, close look at DB2," he said, "but we weren't satisfied with its performance — which was terrible in Release 1.0 — its security or its difficulty of recovery."

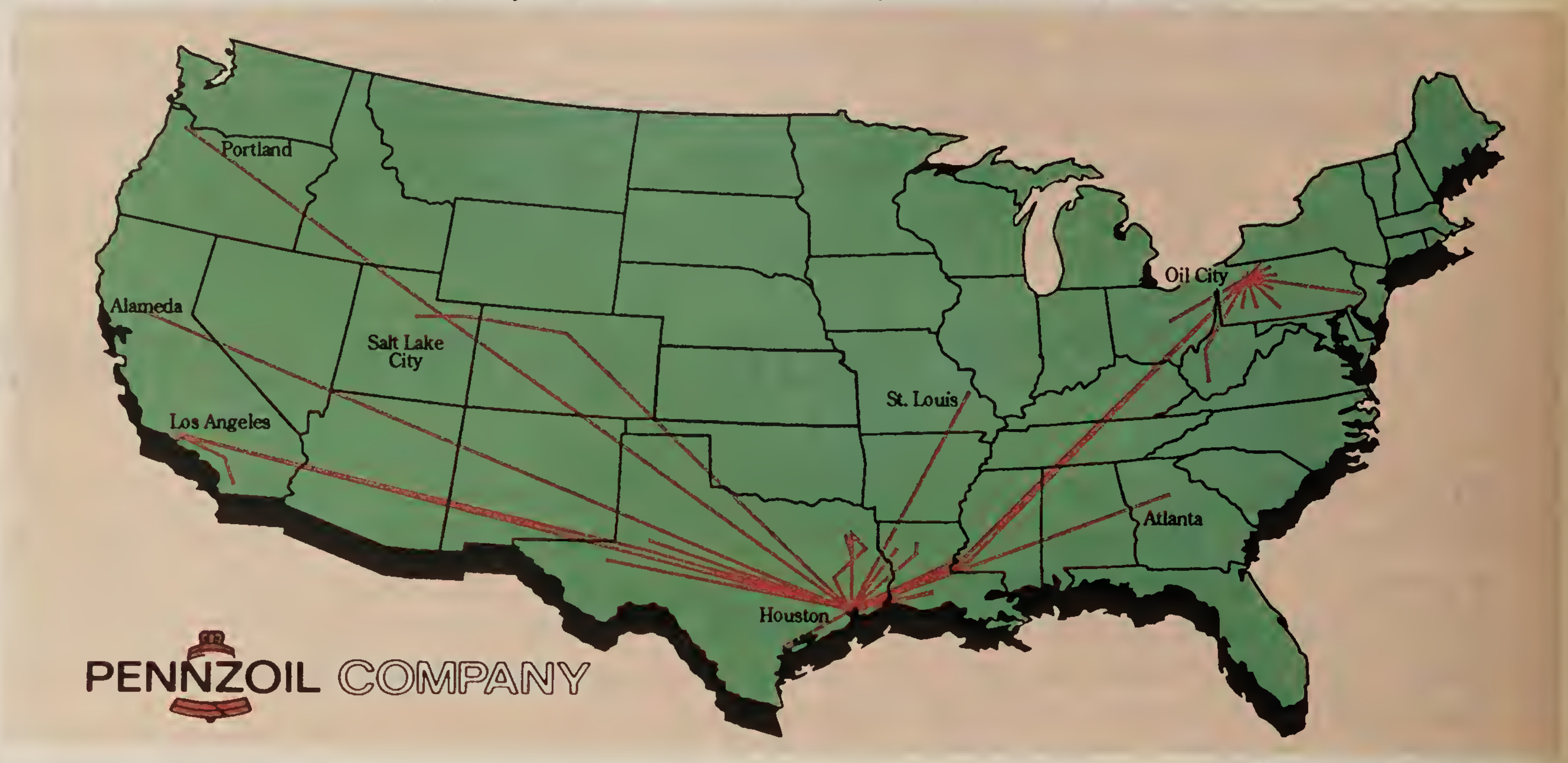
Pennzoil also evaluated Release 2.0 of DB2 but has decided to live without it — for now.

Pennzoil values the separation of its production and inquiry applications, which makes DB2 even less attractive. "DB2 gets you back into the problem we've been trying to avoid," Martin said. "We don't want to mix end-user and production applications, because that may lead to contention for mainframe resources." Instead, the company maintains production data bases for each of Pennzoil's four divisions: Sulphur, Oil and Gas, Petroleum Products and Corporate.

JEAN S. BOZMAN

Business backbone

The voice/data network that Pennzoil's subsidiary will use to build its commercial information services business



INFORMATION PROVIDED BY PENNZOIL CO.
CW CHART

Oil firm

FROM PAGE 1

older oil industry-specific applications that were placed on hold during the mid-1980s downturn in the oil business.

Manning, formerly Pennzoil group vice-president for communications, said there was little risk involved in the venture. "There is no downside risk to it, because all the software we will sell has already been developed," he said.

Profit center spin-offs

Pennzoil's move is one of a series of recent steps by major companies to spin off MIS groups into profit centers. United Airlines earlier this month incorporated its MIS group as a freestanding $350 million company, Covia Corp. [CW, Jan. 18].

> "MYOPIA is a fundamental disease within the MIS community."
>
> KEITH EATON
> STRATEGIC INFORMATION SERVICES CO.

As corporations restructure, they are trying to squeeze profits from divisions that were formerly viewed as corporate utilities.

Strategic Information Services was incorporated in Nevada as a subsidiary of Pennzoil's Richland Development Co. The business plan has conservative estimates of $35 million in revenue for 1988 and $80 million or more by 1993 — amounts that will more than recoup Pennzoil's $50 million investment.

The target market for the Pennzoil subsidiary's software and services is about 2,200 small to medium-size end-user groups in oil, gas and energy companies. But a few industry giants, including Sohio Petroleum Co. and Atlantic Richfield Co., are reportedly interested in running Pennzoil's industry-specific software.

'Information plan'

That new software is the outcome of a four-year collaboration with Pennzoil consulting firm Arthur Andersen & Co. Since 1983, the two firms worked to devise an "information plan" that would standardize all Pennzoil data bases around the Adabas product from Software AG of North America, Inc., as well as simplify the Pennzoil voice/data network that links 132 corporate sites.

Initially, the revamping project was done to make Pennzoil operations more efficient — and to accommodate changes in government regulations that affected software programs.

After a feasibility study in 1984, Pennzoil MIS staffers and a team of 40 from Arthur Andersen rewrote all major financial and oil-related applications. The mission was to do away with custom system utilities and to focus on custom applications instead, said Keith Eaton, Strategic Information Services executive vice-president, who was vice-president of management information systems for Pennzoil.

Eye doctor needed?

"Myopia is a fundamental disease within the MIS community," Eaton said. "Our information plan was enabled by end-user participation and by bringing the business plan and the computer plan closer together."

Manning credits top Pennzoil executives with keeping the software development project.

"Pennzoil's top executives were involved on an ongoing basis for the entire four-year project," Manning said.

"The thrust has to come from top management in order to make an information plan part of the overall strategic plan for the business."

Faced with an eroding revenue base, the U.S. oil industry has been more inclined to cut back than to invest.

Keith Eaton

"The chaos and the restructuring of the energy business in recent years led most MIS organizations in this industry to place a moratorium on development work," Manning said. "We're ahead of the curve because we have already made an investment of $50 million in new technology, while other oil companies are only beginning to put together new development efforts."

Oil, gas applications

Strategic Information Services plans to offer that software — primarily industry-specific applications for the oil and gas sector — as well as to provide remote processing services for the same applications on Pennzoil's twin IBM 3084Q computers.

Additional computer capacity will be added as needed, Manning said.

However, the MIS group that will continue to service Pennzoil's internal data processing needs and support the for-sale software is somewhat smaller than the 400-plus staffing level that existed during the height of the development effort.

Manning said the new firm has 272 employees, all of them from Pennzoil's MIS group. The staff includes 20 people who will sell and support the oil industry applications sold to outside companies, he said.

Product groups

Strategic Information Services will provide a broad array of products, grouped in the following four areas: remote timesharing services, direct software sales, the provision of electronic data interchange services on Strategic Information Services computers and on-site facilities management.

Initially, sales will be restricted to four states — Texas, Oklahoma, Louisiana and Arkansas — in which 60% of the target companies are located. Nationwide sales are scheduled to begin in 1989.

Pennzoil chose to work with Arthur Andersen because of its planning, project management and quality assurance capabilities, Manning said.

Now that Strategic Information Services' software has been developed, Arthur Andersen cannot attempt to participate in the software sales, said Andersen partner Jesse Tutor, who managed his firm's side of Pennzoil's project.

That is because Arthur Andersen will continue in its role as auditor of Pennzoil and as management consultant, according to Tutor.

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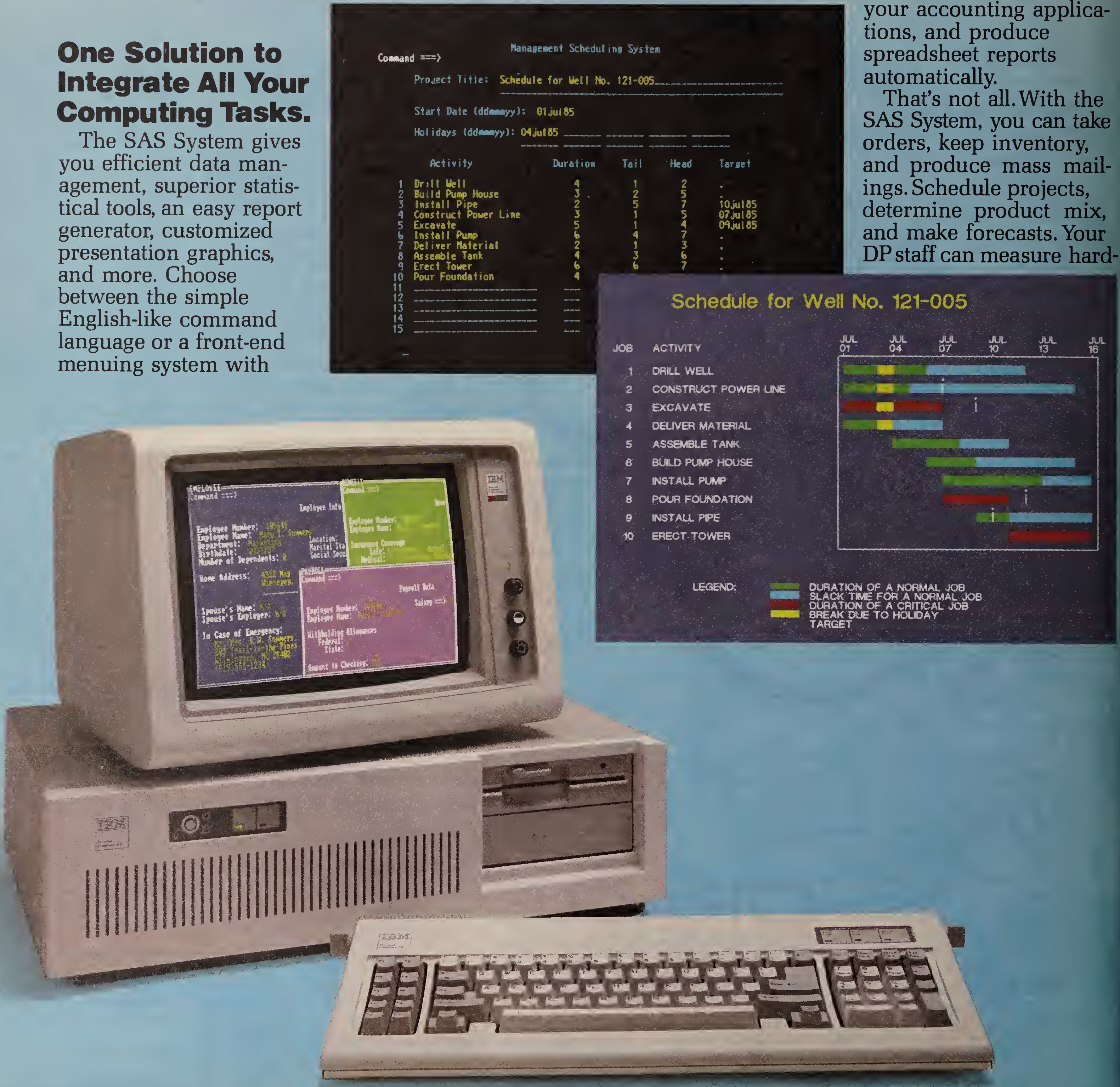

```
                        Management Scheduling System
Command ===>

     Project Title:  Schedule for Well No. 121-005_______________________
                     ____________________________________________________

     Start Date (ddmmmyy):  01jul85

     Holidays (ddmmmyy): 04jul85 _______ _______ _______ _______
                         _______ _______ _______ _______ _______

       Activity                     Duration    Tail    Head    Target

   1 Drill Well                        4          1       2       .
   2 Build Pump House                  3          2       5       .
   3 Install Pipe                      2          5       7     10jul85
   4 Construct Power Line              3          1       5     07jul85
   5 Excavate                          5          1       4     09jul85
   6 Install Pump                      6          4       7       .
   7 Deliver Material                  2          1       3       .
   8 Assemble Tank                     4          3       6       .
   9 Erect Tower                       6          6       7       .
  10 Pour Foundation                   4
  11 _____________________________    ___
  12 _____________________________    ___
  13 _____________________________    ___
  14 _____________________________    ___
  15 _____________________________    ___
```

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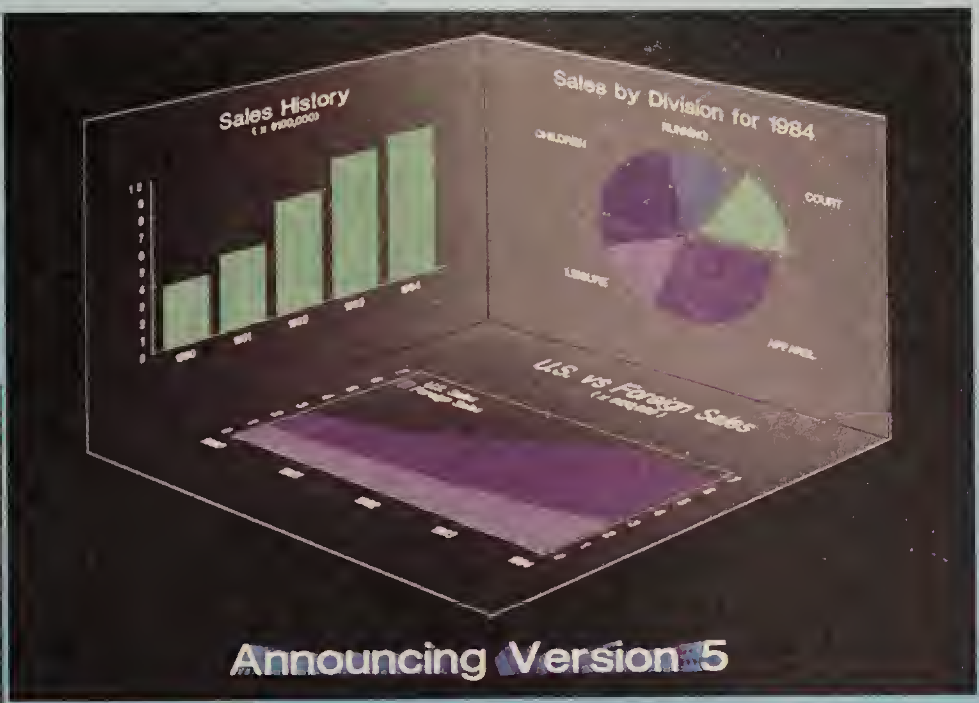

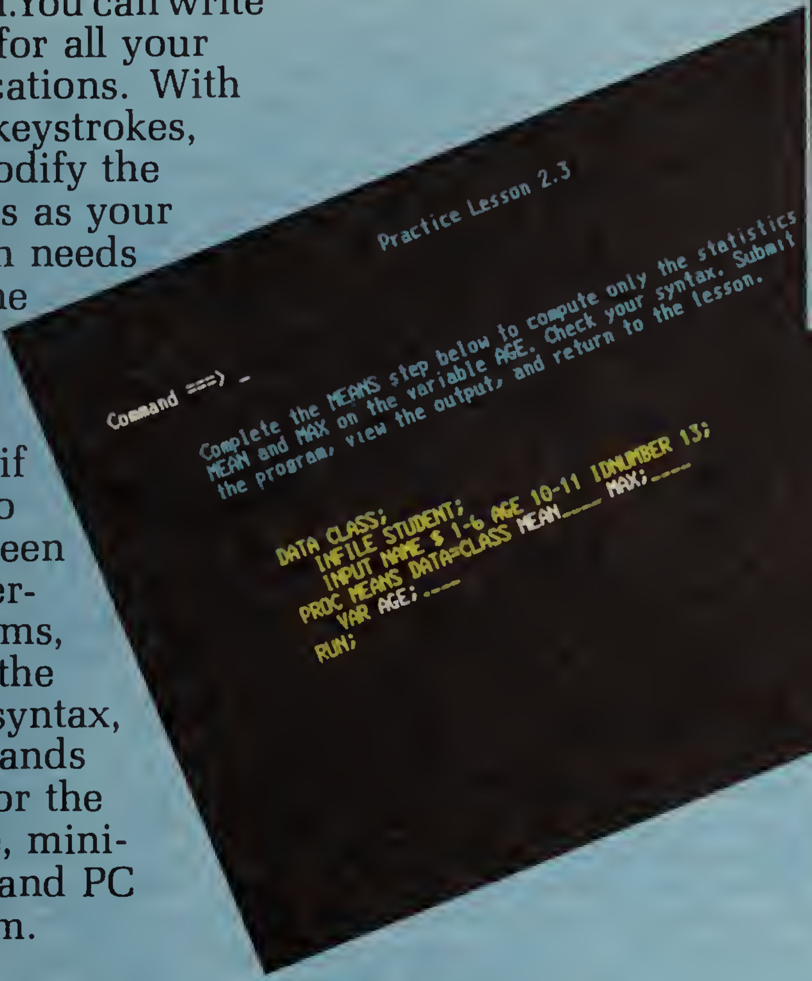

```
Command ===> _

Complete the MEANS step below to compute only the statistics
MEAN and MAX on the variable AGE. Check your syntax. Submit
the program, view the output, and return to the lesson.

DATA CLASS;
   INFILE STUDENT;
   INPUT NAME $ 1-6 AGE 10-11 IDNUMBER 13;
PROC MEANS DATA=CLASS MEAN____ MAX;____
   VAR AGE;____
RUN;
```

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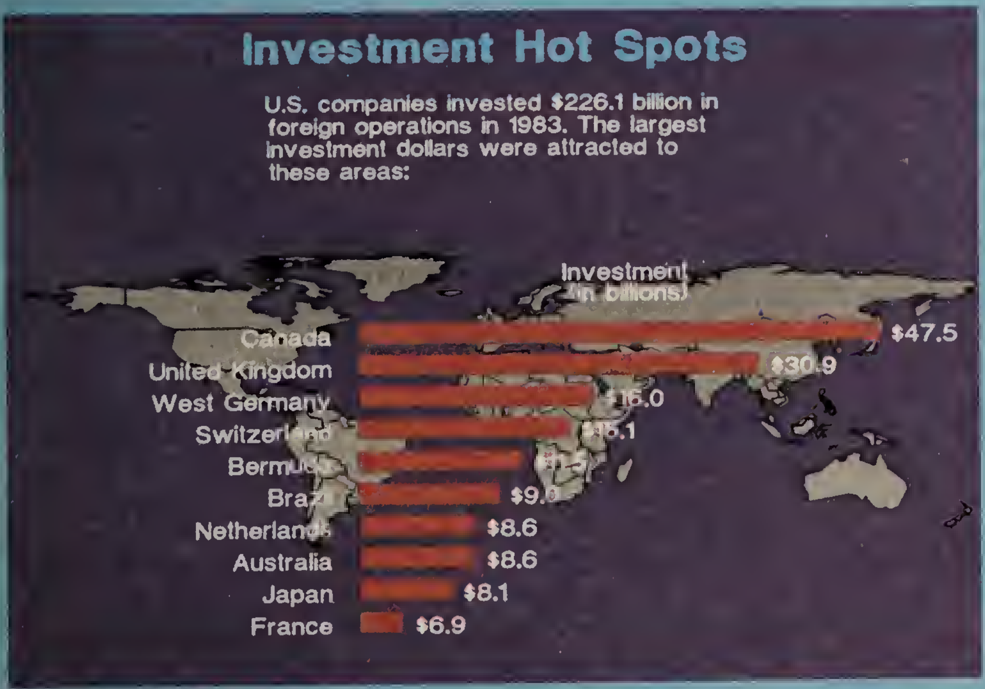

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Chips and Technologies touts PS/2 clone kit

BY JAMES A. MARTIN
CW STAFF

PALO ALTO, Calif. — Chips and Technologies, Inc. last week unveiled what it says are all the components needed to build an IBM Personal System/2 Micro Channel architecture compatible.

At a press conference here, the company introduced chip sets said to be compatible with the Micro Channel Models 50, 60 and 80 and claimed to provide greater performance with less circuitry.

Chips and Technologies also announced two single-chip products based on IBM's Video Graphics Array.

To round out its PS/2-compatible offerings, Chips and Technologies has aligned with Adaptec, Inc. to provide PS/2 disk controllers and bring small computer systems interface adapters to the Micro Channel environment.

Clone by mid-year?

With these products, an IBM Personal Computer-compatible vendor could market a Model 50 or 60 clone by mid-year and a Model 80 look-alike by next fall, according to Raj Jaswa, Chips and Technologies product manager for systems logic.

Although most, if not all, compatible makers are said to be developing a PS/2 clone, Jaswa said his company has not yet signed any contracts with a vendor.

OEMs are hesitant to introduce a PS/2 compatible because of their uncertainty over IBM's PS/2 patents.

After losing significant market share to IBM PC-, PC XT- and PC AT-compatible makers, OEMs have been told repeatedly by IBM that the company will closely guard the PS/2 against potential patent infringements.

Meanwhile, IBM has been careful not to disclose which pieces of the Micro Channel architecture are patented.

It is unlikely that any vendor will release a PS/2 compatible before those legal questions are answered, analysts said.

IBM's terms

"The patent issue needs to be resolved before we'll see any machines based on the Chips products," said John F. Blokker, an analyst and general partner at Hambrecht & Quist Venture Partners in Menlo Park, Calif. "IBM will eventually license its patents, but on its own terms."

According to Jaswa, Chips and Technologies has "requested licensing on all IBM patents current or future [on which] we might infringe."

However, he added, Chips and Technologies strongly recommends that systems OEMs talk to IBM and obtain licensing themselves for any patents that apply.

Jaswa said several OEMs were in the discussion stage with IBM regarding Micro Channel licenses, but he would not elaborate.

Compact design

The Chips and Technologies Chips/250 is a seven-chip set of system-logic circuitry compatible with the PS/2 Models 50 and 60.

The compactness of the design, according to Jaswa, will enable clone makers to introduce a desktop Model 80 compatible rather than the tower configuration of IBM's model.

While Chips and Technologies was the dominant player in the PC AT chip set business, the company is expected to face stiff competition this year from other suppliers, such as Western Digital Corp., which announced in October that it would release Micro Channel chip sets early this year.

In December, Western Digital said it had signed a development agreement with Phoenix Technologies Ltd. for read-only memory BIOS products.

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Focus linked to HP's Spectrum line

Series one of several to offer version of Information Builders' DBMS

BY ALAN ALPER
CW STAFF

NEW YORK — Information Builders, Inc. is expected to disclose a development deal next month with Hewlett-Packard Co. to devise a version of the former's Focus fourth-generation language and data base management system for HP's Spectrum series.

Information Builders' cofounder and president, Gerald Cohen, declined to confirm or deny the impending agreement, but sources close to the company told *Computerworld* they expect an announcement to be made in February. They also said the version would be made available by year's end and would run on HP's line of reduced instruction set computing minicomputers under HPX, HP's proprietary operating system, and Unix.

It is believed that Information Builders will port its version of Focus for Unix, which is written in C, to the HP hardware platform. Since the firm would use its own Unix version, there would be few technological hurdles, sources said. The company would have to tailor the fourth-generation language and DBMS to work with HPX and in conjunction with other tools developed for Spectrum.

HP recently began formally offering Unix to its commercial customers as an alternative to its proprietary operating system. HP supports AT&T's Unix System V, Release 3.1.

'Let's seal the deal'

Both Information Builders and HP are believed to be eager to seal the deal. Having a Focus version for Spectrum would likely provide needed impetus for Spectrum, which, after numerous delays, has yet to live up to HP's expectations. Information Builders would benefit from overlap of its customer base with HP hardware, sources said.

If concluded, the Spectrum port would join numerous other versions of Focus that run on IBM mainframes, Digital Equipment Corp. VAXs, IBM Personal Computers and compatibles and Wang Laboratories, Inc. systems. Pricing of the Spectrum version would be equivalent with that of the VAX on a million-instructions-per-second basis, sources said.

Meanwhile, Information Builders is also said to be investigating the possibility of porting Focus to the Apple Computer, Inc. Macintosh environment. At a meeting last week in New York for about 500 Focus developers, Cohen said his company has begun a discovery project to assess the market requirements for such a product.

"We've determined that it is technologically feasible," he said, "but we're not sure if there is a market for such a product."

Cohen said Information Builders' technology would debut in the Macintosh world within the next few months, when the company begins shipping a version of its Level 5 expert system for the Mac.

In another matter, Cohen said Release 6 of Focus for IBM mainframes will allow users to make use of the added throughput of IBM's MVS/XA by running the fourth-generation language and DBMS above the 16M-byte limit. The release, expected to be unveiled in incremental upgrades throughout the year, would enable users to create separate regions of Focus in a manner similar to that in which CICS and IBM's Time Sharing Option are used.

IBM coding

FROM PAGE 1

the 370 mainframes, on which they are not commonly found today, IBM officials disclosed in a briefing with *Computerworld.*

The effort stems from both the firm's internal use of AI and the success stories of some its largest customers with fledgling expert systems.

It also stems, IBM officials freely acknowledged, from an appreciation of the ability of resource-hungry AI to rekindle demand for "MIPS and disks," said Herbert Schorr, group director of Products and Technology Information Systems at the Information Systems Group's headquarters here.

An availability date was not given for the knowledge processing architecture, and several third-party vendors said that although they believe IBM's intentions are sincere, they think the goal will take a long time to accomplish.

David W. Belote, IBM's manager of market development for knowledge-based systems, said the company wants "the shell vendor to get away from worrying about how to connect to the IBM system." The goal, he added, is "to encourage vendors to think of IBM as the preferred platform for expert system applications." Belote said support will exist for IBM's Personal System/2s and mid-range processors as well as 370s.

In committing itself to providing open pipelines to its hardware platforms, IBM is saying it is willing to cooperate with its competitors. For two years, IBM has been offering a user-friendly shell-building system, Expert System Environment; more recently, the firm has offered a programmer-oriented system, Knowledgetool.

'Wants a winning product'

"It doesn't surprise me at all. That's often what IBM does when it doesn't have a winning product of its own," said Harry Reinstein, president of Aion Corp., one of the few shell makers whose system works in an existing IBM mainframe environment.

Reinstein said large corporate customers like Northern Telecom Ltd., The Prudential Insurance Company of America, Chubb & Sons Insurance and Northern Trust Corp. were customers for the Aion shell last year. Commercial customers want to use inference processing and "high logic" that reflects the rules of running the business in their applications, he said.

Aion and Application Expert, a product from Cullinet Software, Inc., are two of the few well-known shell systems that work in an existing IBM mainframe environment.

"We're interested in plugging into the IBM world. Most of the people we deal with have existing IBM data bases and systems," said Alexander D. Jacobson, chairman of Inference Corp., the Los Angeles producer of the Automated Reasoning Tool.

Schorr said cooperation with third-party vendors has always been part of IBM's strategy for encouraging the use of AI. IBM signed a joint development agreement last year with Intellicorp in Mountain View, Calif., to provide an MVS version of its KEE system.

In addition, IBM has been experimenting with building its expertise into MVS and Systems Network Architecture monitoring software. Its Yorktown Heights, N.Y., research laboratory produced a YES/MVS expert system for managing MVS operations. It worked well at one site but not as well when it was tested at a site with a different system configuration.

"Each customer has a different configuration and installation policy. We need some kind of custom facility with which to tailor an expert system," Belote said.

Nevertheless, success stories like Firemans Fund Corp. and American Express Co. in the use of expert systems is kindling a larger demand among commercial customers, and IBM wants to move as rapidly as possible to meet it.

MAP/TOP: Live before your very eyes

Supporters unite in OSI cause to develop fictitious, but working, multivendor network

BY KATHY CHIN LEONG
CW STAFF

LONG BEACH, Calif. — In a carefully orchestrated effort to spur support for Open Systems Interconnect (OSI) and multivendor cooperation, the MAP/TOP Users Group and the Corporation for Open Systems (COS) last week detailed the elements of the Enterprise Networking Event, scheduled for June in Baltimore.

The live demonstration will link the computers, robots and programmable controllers of approximately 50 vendors on a Manufacturing Automation Protocol/Technical and Office Protocol (MAP/TOP) network with nodes both domestic and abroad.

MAP and TOP are communications standards supported by General Motors Corp. and The Boeing Co. Both follow the OSI protocols.

Getting strong now

To participating vendors, the demonstration represents months of development and painstaking conformance testing at the Industrial Technology Institute, a MAP consultant in Ann Arbor, Mich., to ensure that their computers communicate with other network devices.

By July, the MAP 3.0 final specification will be available for worldwide use, said Chuck Gardner, chairman of the MAP/TOP Users Group.

As the users group agreed at its last meeting in September 1987, MAP 3.0 will remain stable for the next six years, giving vendors a chance to create products and offering users an opportunity to install test sites without worrying about MAP being a moving target.

The vendor community and supporting organizations will have spent a total of at least $50 million in costs for the demonstration, said Mike Canepa, chairman of the Enterprise Networking Event's steering committee.

> THE DEMONSTRATION represents months of development and painstaking conformance testing to ensure that vendors' computers communicate with other network devices.

While Autofact, a similar MAP demonstration held in Detroit in 1985, emphasized the potential capabilities of MAP 2.1, this year's project boasts the new functions inherent in MAP 3.0, which include network management and enhanced messaging specifications. Unlike the Autofact demonstration, vendors must show only products that will be made commercially available.

A bird's-eye view of the floor will reveal one backbone broadband MAP IEEE 802.4 network, including 802.4 carrierband network segments for MAP cell controllers, and one backbone TOP IEEE 802.3 baseband network. Sun Microsystems, Inc. Sun-3 routers will be used to connect the MAP and TOP networks.

In the show floor demonstration, nine key participants will form a fictitious department, each specializing in one aspect of the production and manufacturing scenarios.

For instance, Boeing, working with products from Xerox Corp., NCR Corp. and Digital Equipment Corp., will be in charge of the order entry department.

Using the CCITT X.25 packet-switching Accunet service from AT&T, vendors involved with the Communication Network Manufacturing Applications group will have equipment at the British Aerospace PLC facility in Preston, England. This group will demonstrate its role as a fictitious supplier, using MAP to communicate with the mock manufacturing entity in Baltimore.

The U.S. Air Force, with Hewlett-Packard Co., Intel Corp. and other suppliers, will work to design the fictitious product electronically. At the same time, these vendors plan to demonstrate how the aerospace industry can use MAP technology to change an aircraft engine mount.

Down the line

As the process of manufacturing begins, the Deere & Co. booth will use the MAP network, including products from Concord Communications, Inc. and Advanced Communications, Inc., in coordination with a laser cutting device to saw pieces of the product in its just-in-time manufacturing department.

GM, with products from Allen-Bradley Co., GE Fanuc Automation and Siemens AG, will be involved in the final assembly portion of the demonstration. Robots and a voice-activated speech inspection system will organize the customized goods and guide them out the door. The COS, with equipment from IBM and National Advanced Systems Corp., will prepare the invoice using the OSI FTAM.

"How well MAP is accepted will depend on how well the event works," said John Callahan, managing director at consulting firm Information Technology Research. "When users go to the event, they will be able to tell what's real from the hype."

Wide support waiting for final form

LONG BEACH, Calif. — The usual promises of the potential of MAP were reiterated at last week's MAP/TOP Users Group meeting: cost-effectiveness, eventual shortening of production cycles and increased industrial competitiveness.

The Manufacturing Automation Protocol/Technical and Office Protocol (MAP/TOP) specification received a strong vote of confidence from the existing installed base of MAP users but garnered skepticism from users on the sidelines who said the MAP specification is still too elementary.

"I just don't think I can install MAP tomorrow and have it do the things I do in my network today," said one user who wished to remain anonymous.

Other users at the meeting said MAP must further address such issues as network security.

Anticipation

With emphasis on the June Enterprise Networking Event (see story above), the conference yielded little in major user announcements. In fact, until MAP 3.0 products actually come to market, users agreed that vendors will have a difficult time selling MAP 2.1 products into end-user shops.

Digital Equipment Corp. was noticeably quiet at the meeting, with only brief mentions by other suppliers that DEC gear will be used at the Enterprise Networking Event.

IBM, represented by Ron Bailey, manager of product requirements for manufacturing systems products, again stated the company's support of MAP.

"IBM's SNA and MAP can complement one another in a company," he said, referring to IBM's Systems Network Architecture.

Other vendor announcements included the following:

- Motorola, Inc.'s microcomputer division introduced a Mini-MAP controller board based on DEC's VMEbus. Priced at $995, the board features the new Motorola token-bus controller chip and acts as a network interface to control access to other MAP nodes. Also called the MVME373, the board lets up to eight serial devices communicate.

  It is slated to be available in the fourth quarter of this year.
- A personal computer software product from Marketech called Mapmaker helps users determine how to implement and grow a MAP network. The expert system helps users plan their network and analyzes requirements. It is scheduled to be available in the second quarter of this year. Price has not been determined.
- Retix, Inc., an Open Systems Interconnect (OSI) protocol vendor, announced it is shipping the seven-layer suite of MAP/TOP 3.0 protocols to OEMs and systems integrators. The Retix MAP 3.0 protocol features the OSI FTAM Phase 2 protocol, the X.500 directory protocol and network management.
- Concord Communications, Inc. will expand support for OEMs with a MAP modem tester. It will support broadband, carrierband and fiber-optic modems. Priced at $24,000, the tester includes software, firmware and documentation, the vendor said.

KATHY CHIN LEONG

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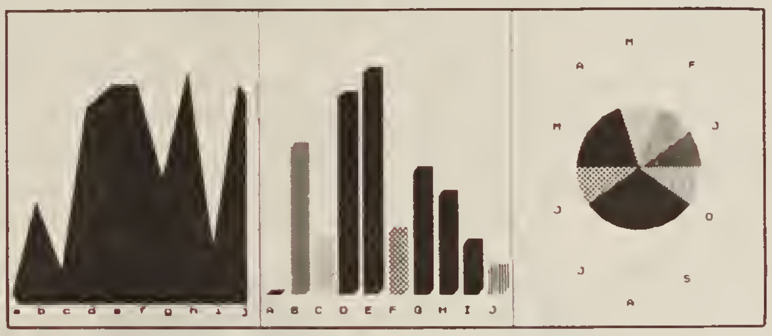

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SNA bonds highlight Mac grasp for host ties

BY PATRICIA KEEFE
and STEPHEN JONES
CW STAFF

ANAHEIM, Calif. — Fulfilling a year-old commitment, Apple Computer, Inc. is scheduled to unveil support for IBM's Systems Network Architecture (SNA) and host environments today, kicking off Infonetics, Inc.'s second annual Infonetics Desktop Communications show here.

Apple reportedly will introduce four communications and networking development products designed to continue the warming trend between MIS and Apple's Macintosh.

Targeted at MIS departments and commercial developers, Macworkstation 3.0 is a programming tool kit designed to provide a platform for Mac-to-host applications as well as high-level access to the Macintosh Toolbox.

Access boosted

Apple claimed programmers can gain full access to, and control over, the Mac's pull-down menus, windows and dialogue boxes without having to learn the specifics of the Mac programming environment.

The tool kit is scheduled for availability next month at a price of $2,500 per site license.

Apple said it will implement LU6.2 for distributed processing on the Macintosh Plus, Macintosh SE or Macintosh II. MacAPPC allows the Mac to talk with other personal computers on a network and to start tasks independently.

The toolbox includes all LU6.2 communications protocols and a set of utilities for installation and configuration of network components. Site licenses for MacAPPC will cost $2,500 and should be available this summer.

> APPLE reportedly will introduce four communications and networking products designed to continue the warming trend between MIS and the Macintosh.

Another developer's building block is Apple's coprocessor platform, designed to provide real-time multitasking operating system capabilities. Peter Hirshberg, manager of host systems integration at Apple, described the product as "the fundamental linchpin for future offerings." The coprocessor platform has the ability to provide communications services and run protocol suites.

The coprocessor is built on a Nubus card with a 10-MHz Motorola, Inc. 68000 microprocessor and a Nubus interface. It requires 512K bytes of random-access memory and is slated for availability in February.

Apple is also expected to announce an upgrade to its Appletalk for VMS, which will support Ethernet and the Appletalk Datastream Protocol. Version 2.0 provides additional support for Appletalk protocols in non-Apple environments. Site licensing is scheduled to start in March at a price of $5,000 per site.

Mixed bag

Approximately 25 other products are expected to be introduced by third-party vendors at the show. Some of those offerings include the following:

- Network Innovations, Inc. is scheduled to unveil CL/1, a connectivity language said to let PC software developers access and integrate their own applications, minicomputer and mainframe data and applications.
- Touch Communications, Inc. said it will roll out an ISO Open Systems Interconnect-based network implementation that runs over Ethernet and supports Macintoshes, IBM Personal Computers and DEC VAXs.
- Dayna Communications, Inc. is slated to introduce an electronic mail package for the PC and Mac worlds that features correspondence management and the ability to interface with Action Technologies, Inc.'s The Coordinator mail package.

A number of software vendors are reportedly ready to announce Mac-to-IBM products that use development tools from Apple.

"Apple now has the tools that are fundamentally useful to MIS, allowing MIS to provide all the benefits of the Mac while tying it into existing systems," Apple's Hirshberg said.

Apple caters to MIS

Menu includes support of major standards

BY PATRICIA KEEFE
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. executives last week backed up a commitment to MIS with guarantees to provide multivendor integration by supporting the major interoperability standards.

In an interview with *Computerworld*, Peter Hirshberg, Apple's manager of host systems integration, said those standards include IBM's Advanced Program-to-Program Communications, the ISO's Open Systems Interconnect (OSI), Integrated Services Digital Network (ISDN), CCITT X.25 and Transmission Control Protocol/Internet Protocol (TCP/IP).

Those statements are strengthened by recent announcements designed to integrate the Macintosh into major systems environments, most notably IBM and Digital Equipment Corp.'s.

Apple has always catered to the work group and the individual user. But there is a new emphasis at the firm on producing products and tools designed to let MIS get more out of its investments in Macintosh technology, Hirshberg said.

Toward that end, Apple is set to announce a series of development tools integrating the Mac into IBM host and Systems Network Architecture (SNA) environments today at the Infonetics Desktop Communications show in Anaheim, Calif. (See story left).

Using these tools, "an LU6.2 application on another system can be invoked from any Mac system, whether it links directly to an SNA environment or to a server through Appletalk," said Anthony Cagle, Apple's manager of communications product development.

Also significant, according to Hirshberg, is Apple's recognition of the investment MIS departments have in programmers trained in host disciplines. Access to the DEC world is also important. Apple earlier this month unveiled a joint development agreement with DEC under which the vendors will work to integrate their environments under the OSI standard.

Long-term goal: OSI

Although Apple has promised to deliver standard TCP/IP drivers to the Macintosh community, OSI is its long-term strategy for multivendor connectivity.

"We see TCP/IP as the stepping stone to OSI," Cagle said.

"Our focus is on moving Apple into the mainstream environment of our customers, which is increasingly OSI," Hirshberg agreed.

Apple is also strongly committed to ISDN. "We are actively pursuing ISDN technology; you can expect an announcement within the year," Hirshberg said, adding that Apple will be involved in ISDN trials.

"There will be a huge deployment of ISDN technology in the U.S., and we are determined to be a part of it," Cagle added.

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Language scales Mac-VAX network wall

BY NELL MARGOLIS
CW STAFF

ANAHEIM, Calif. — Network Innovations, Inc. plans to put forth today a communications language that it claimed will connect desktop computer applications to a broad assortment of minicomputer and mainframe data bases using extended SQL commands.

The Cupertino, Calif.-based company, which has marketing agreements with both Apple Computer, Inc. and Digital Equipment Corp., said the first product under its CL/1 language umbrella can be used by developers to connect applications on Apple's Macintosh to data bases on DEC's VAX without making users exit their local programs.

The announcement, which is expected to be made at the Infonetics Desktop Communications show here today, comes less than two weeks after Apple and DEC formed an alliance to link their product lines.

Network Innovations' latest offering is based on ANSI-standard SQL. "If you can use interactive SQL, you can use CL/1," said Network Innovations marketing manager Edward A. Forman. CL/1 is built on a requester-server architecture. The CL/1 Developer's Toolkit for the Macintosh is a set of Mac and VAX software designed to aid the applications developer in creating applications that support the connectivity language.

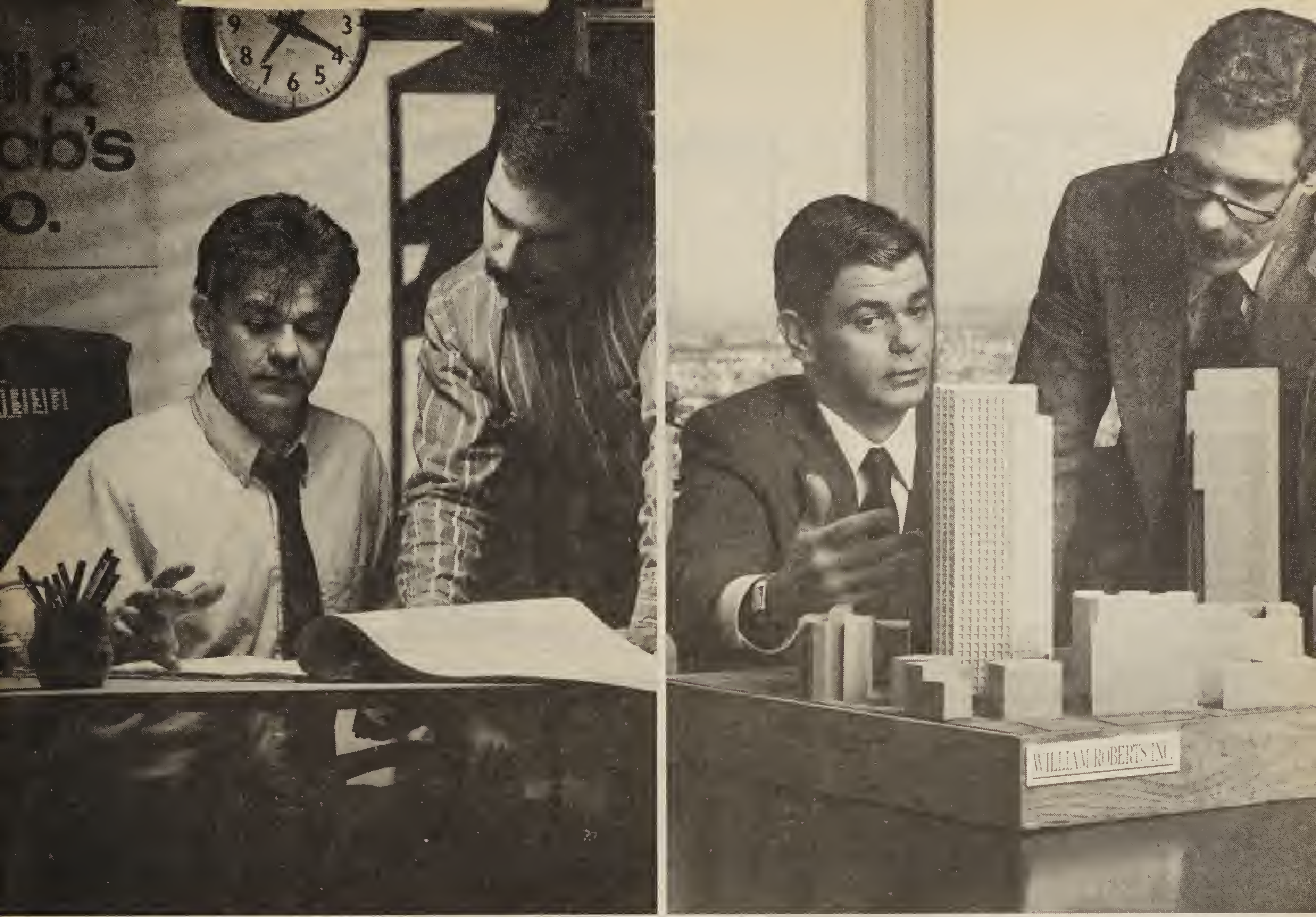
The CL/1 Server for VAX/VMS, which is installed on each VAX system the user wants to access, processes Mac-based requests and routes them to the VAX through an application program interface (API). Data is also sent back to the Macintosh through the API.

The tool kit will cost $3,500; server prices will range from $3,000 to $23,975, depending on the CPU. Both should ship in the second quarter.

CL/1 supports DEC's own relational data base management system, VAX RDB/VMS, and RMS files as well as third-party market leaders Oracle, from Oracle Corp., Ingres, from Relational Technology, Inc., and Sybase, from Sybase, Inc.

"The critical element," Forman said, "is that all of this is wholly transparent to the programmer. He doesn't have to care whether the data base he needs to access is on a Unix or VMS platform, whether it's Ingres or Oracle or RDB. All he has to know is what information he needs — and CL/1."

CL/1 includes a verb set that consists of 13 standard SQL manipulation verbs plus 32 verbs to handle connectivity procedures, variables and printer resources. The CL/1 package also comes with an API that resides on the desktop computer and an incremental compiler that speeds the translation process by creating reusable code.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EDITORIAL

Sema-tough

ANYONE SELLING ANYTHING can take a lesson in marketing from the state of Texas — Austin in particular. Earlier this month, the capital of this state, whose economy has been rocked by the oil glut, succeeded in wooing the nation's first semiconductor co-op to settle there. Sematech will pump hundreds of millions of dollars into the local economic chest and directly and indirectly create thousands of jobs (see story page 75).

Sematech will become the second such consortium to settle in the college town. *Computerworld* readers will recall that Austin also got the nod in 1983 from Microelectronics and Computer Technology Corp., which, like Sematech, was courted by municipal suitors all over America.

Essentially, "Big A"-style marketing is a primer on how to treat a prospect. For information managers, the prospects increasingly are the chief financial officers or chief executive officers of the world, who must be administered the hard sell for major projects. Here's the Texas marketing formula:

Mobilize and unify your marketing forces. It was clear to both Sematech and MCC officials that the entire city of Austin was behind its courting efforts. City officials formed a "woo Sematech" organization. A united front was presented by Texas congressmen, the governor's office, local politicos and civic groups.

Trot out the big guns. When Bob Inman, MCC's founding chairman, arrived to inspect the proposed Austin site, he was greeted at the airport by Lady Bird Johnson. Reports surfaced that H. Ross Perot further induced Inman with free use of his jet for a year. With Sematech, Lone Star U.S. Rep. Jake Pickle scored points with the consortium site-search committee by facilitating the U.S. government's loan of $100 million to Sematech. U.S. House Speaker Jim Wright — he's a Texan, too — greased skids in the direction of Austin. Texas Gov. William Clements held more than one tete-a-tete with Sematech officials in the privacy of the governor's mansion. Governors in other contending states put forth feeble efforts by comparison.

Put on your best dress. Let the client know just how good you are. Among the finalists in the Sematech bidding were high-tech strongholds in Massachusetts and California. But the adroit Austinians could easily point to the Sun Belt cost of living, where a new home costs $150,000, compared with $350,000 and up in the other two areas. It's also hard to beat the climate in Austin.

Make 'em an offer they can't refuse. Sematech's people were concerned about the availability of a clean room, so a local task force was organized to build a simulated room. When MCC raised questions about the long-term availability of labor, the state added technology chairs at the University of Texas at Austin and inaugurated a microelectronics research program.

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LETTERS TO THE EDITOR

Equal time

I want to respond to the *Computerworld* readers who wrote regarding the article "What threatens mainframe computing" [CW, Oct. 19, 1987].

In particular, I would like to correct misstatements of fact and other misrepresentations that were included in letters published through Nov. 30, 1987.

- The article compared and contrasted the millions of instructions per second (MIPS) rates of mainframes such as IBM's 4381 Model 22, 3090 Model 600E and 370/168 with the IBM Personal System/2 Model 80. I did not state that the PS/2 was the equivalent of a 4381 Model 12.
- People in the data processing industry who made similar comparisons and contrasts include Bill Gates of Microsoft Corp., John Sculley of Apple Computer, Inc. and William Zachmann of International Data Corp.
- I never conceded that it takes several 80386 instructions to perform a 370 instruction. My contention, as stated in the article, is ". . . there is no substantial quantifiable difference between 80386 and 370 machine instructions."
- I never stated that throughput is not an important issue. In fact, I drew attention to how bad basic performance was the dominant determinant of system failure.

The reader failed to understand that mainframes do not constantly write each updated record to disk. They buffer, write to expanded store, cache and log to disk or tape during a transaction. There is absolutely nothing inconsistent with a PS/2 doing the same thing.

- The so-called make-believe hardware and software I had in mind to support my position included Compaq Computer Corp.'s 386, the PS/2 Model 80 and IBM's Token-Ring network.
- The suggestion to lash together hand-held calculators has been adopted by Avis, Inc. Companies such as Echlin, Inc., an automotive parts manufacturer, are lashing together Compaq 386s and Personal Computer ATs, converting from an IBM 4381 environment and estimating $300,000 a year in savings.
- I never stated that there was a conspiracy among MIS directors and managers to perpetuate the use of mainframes.
- Many large corporations are downsizing their data processing installations to minicomputers, Digital Equipment Corp. VAXs and IBM 9370s and System/38s. The preservation of software investment is important, but most of the 20-year-old software is not worth salvaging. The best thing an MIS executive can do is insist that costly technology infrastructure decisions are not based on high-tech superstition about the need for mainframes when less costly PS/2-type solutions will do. How one does this is by emphasizing formal, structured architecture-based systems planning.

Finally, in an editorial titled "Alive and well" [CW, Nov. 23, 1987], we were assured that ". . . early reports of the mainframe's death are exaggerated."

This conclusion is reached after a cavalier dismissal of the 50-to-1 economic benefits of PC MIPS vs. mainframe MIPS, a convoluted assertion of the fallacy that PC MIPS are not the same as mainframe MIPS because, of all things, "disk I/O potential," and the circular proposition that because mainframe power is on desktops and mainframes are here today then they will be here tomorrow.

Fred J. Viskovich
Coopers & Lybrand
Management Consulting
Services Division
Information Systems Group
Philadelphia

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

This week in history

Jan. 23, 1978
Legislation that bolsters the Department of Health, Education and Welfare's (HEW) crackdown on welfare cheaters through computer cross-checks is on the books. The law requires the HEW secretary to make wage information contained in Social Security Administration files available to state and local welfare agencies to help them determine an individual's eligibility for aid or services.

Jan. 24, 1983
Apple Computer, Inc. shakes up the office systems market with its long-awaited Lisa system, a 16-bit microcomputer that reportedly runs several applications simultaneously. The microcomputer maker also brings out the Apple IIE, an enhanced version of the Apple that incorporates very large-scale integrated circuitry.

Round or rectangular, holes don't make the company

EFREM MALLACH

Much of the world is moving to Unix.

A recent study by International Data Corp. measured the percentage of hardware dollar sales for operating systems since 1981 and predicted market share to 1991.

IBM mainframe operating systems now drive 25% of all hardware shipments but should drop slightly. Microsoft's MS-DOS grew to about 20% by 1986, and the combined MS-DOS and OS/2 operating systems should grow no more than 1% by 1991.

Unix shows the biggest predicted gain, from less than 10% today to a about 20% in 1991. If nearly all vendors support Unix, and if Unix standardization means nearly all vendors will have access to the same applications, how will vendors differentiate themselves?

Taking a different shape

People with hairlines like mine may remember Univac's round-hole 90-column punch card. This card format was a sales barrier: Many potential customers had rooms full of tab equipment that used IBM-style cards with rectangular holes and 80 columns.

Eventually, Univac moved to rectangular holes, but not without pain. Odd as it may sound in 1987, people were emotionally wrapped up in the shape of the card holes. They felt Univac's identity was somehow embodied in round holes. Changing to rectangular holes would mean losing this identity.

Of course, Univac didn't lose its identity when it changed to IBM-style cards. Its personnel discovered that a firm's identity is embodied in larger, more important issues.

Honeywell went through a similar process a few years later. Its large-scale systems of the early 1960s used ¾-in. magnetic tape. The rest of the world used ½-in. tape. Honeywell came around, too, but with much wringing of hands and worry about loss of identity, which didn't happen in this case, either.

The same thing has happened in software. For example, a standard Cobol would mean the demise of proprietary languages, with their odd statements matched to unique hardware instructions. If proprietary languages go away, what will distinguish one hardware offering from another? Where is the corporate identity?

A more recent issue involves instruction sets. Nothing defines the essence of a computer as much as its instruction set. With so many systems using the same microprocessors, what differentiates one from another? The problem hasn't materialized in this instance, either. The Intel 80386 is the basis for systems as distinct as IBM's PS/2 Model 80 and Sequent's 27-processor offering.

Now that we're no longer hung up on hole shapes, tape widths, programming languages or instruction sets, what's left? The operating system. Surely nothing could be more important. It defines the entire user visibility of a system: software, user interface and all. What will happen to vendors if the world standardizes on Unix?

No more than happened when the world standardized on a punch-card format. Firms will still differentiate themselves through overall product concepts. A PC running Xenix has little in common with a four-processor Amdahl mainframe running UTS, even though the same applications (with obvious limitations) can run on either one.

Amid the madding crowd

Even among similar products, differentiation will exist. The NCR Tower, Honeywell Bull XPS-100 and NEC Astra XL families share general features. They run AT&T's Unix System V, use the Motorola 68020, were designed for commercial use and support a few dozen users. Yet they vary in design specifics. Some features appeal more to some prospective buyers than to others.

More importantly, systems vary in the depth and types of support available from their suppliers. Suppliers vary in the types of businesses they understand and can help with, in their willingness to help and in their fees for helping.

They vary in corporate strategies. They vary in distribution channels. In short, they vary in the ways suppliers of most mature products vary: not by technical nuances that have little impact on the suitability of a product for an application but by the needs a firm chooses to meet and how it approaches them.

To the buyer selecting a vendor, these are far more important issues. And they will remain, even if every computer in the world uses the same operating system.

Mallach is a faculty member of the Boston College School of Management and a consultant to user and vendor executives. Based in Needham, Mass., he recently published *Win Them Over: A Survival Guide for Corporate Consultant Relations Programs.*

Knee-deep in unneeded data

Are you brave enough to recommend a disk audit to your users?

NAOMI KARTEN

I am convinced that in 2,000 years, when archaeologists dig up what we think of as the civilized world, what they will find is data. Scads of it. Enough to bury entire cities.

Of course, this find shouldn't be surprising, because what today's technology does — and does well — is encourage people to hang on to what they have.

In the third generation's heyday, things were different. We had to economize. Disk space was a finite asset. We couldn't keep all the data we wanted, no matter how valuable it was.

We weren't exactly suffering from data deprivation. When I was an MIS manager, we kept more than 40 billion characters of data in various data bases and files. Even with the most advanced disk storage available at that time, it made for a pretty crowded computer room.

So we had no choice but to manage the data. That meant purging what was clearly not needed and archiving data that might be needed but not on an active basis.

It meant using tapes galore, and when the number of tapes exceeded the space available, it meant reallocating tapes to newer applications. It meant a formal process was needed to make sure that obsolete data was eliminated and that needed data could be readily retrieved.

Of course, there were some glitches in this process. The first was that someone had to know the right questions to ask. Questions like, Do you really need data that goes back to 1899?

Asking such questions is a waste of time, unless the person asked replies honestly. An example of an honest reply would be, "No, I don't need that data anymore. Why don't you free up the space for a more useful purpose?" Fewer than three people in all of recorded history have ever said that.

The proof of the continued existence of these glitches stares me in the face every time I scan my mail. My family has lived in the same house for 14 years. When we moved in, the previous owner left no forwarding address. He hasn't been seen or heard from since. He was elderly, in less than perfect health and may well be dead by now.

DOESN'T anybody ever say, "Hmmm, this data base is getting mighty large"?

But he keeps getting mail. In the "Takes the Cake" category of business management, several times a year, stores invite him, as a highly valued customer, to take advantage of a special sale. There's his name, letter-perfect, on the computerized label.

Doesn't anybody ever purge their files? Doesn't anybody ever wonder what it costs to keep sending mail to someone who hasn't shown any sign of existence for 14 years? Doesn't anybody ever say, "Hmmm, this data base is getting mighty large"?

The truth is that today's computer technology makes people lazy. You can store more data and process it faster every year, so why bother cutting back?

Get more than you need

Personal computers add to the data overload immeasurably. When storage was limited to 360K-byte diskettes, people made do with 360K-byte chunks of data.

When hard disks came along, everyone suddenly needed 10M bytes. The space filled up quickly, but before anyone had a chance to worry about it, along came 20M-byte — and 50M- and 100M-byte — drives.

With that kind of space, you have room to play around. Why make a big deal over a file that's no longer needed when there's so much space to grow into? Why make yourself look foolish recommending an occasional disk audit to people who simply can't understand fussing over 20K bytes here and 30K bytes there when they've got 75M bytes at their fingertips?

Multiply that 75M bytes by the number of personal computers out there, and you can't help but be impressed by all that data. The fact that it resides in files with names only eight characters long means you've got to be more than a creative genius to name it all. File-finder utilities are destined to become the software of choice in this generation.

BOB DAHM

In the year 3988, when archaeologists are busily digging with their teaspoons, one of them will suddenly shout, "Eureka! I've found something."

When he reaches down and picks it up, he'll be surprised to discover it's a 5. Or a 78. Or a 02368KRTN. As they all start digging furiously, they'll quickly realize they're in a bottomless pit of data.

"Curious society they had back then," they'll say.

No more curious, I suppose, than a society that stores computer publications forever, even when the technology becomes obsolete a week after it is reported.

Karten, president of Karten Associates in Randolph, Mass., is a consultant, trainer and lecturer in the management of end-user computing. She is editor of the monthly publication "Managing End-User Computing," published by Auerbach Publishers, Inc.

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The box here lists the various software categories, and each category boasts multiple vendors.

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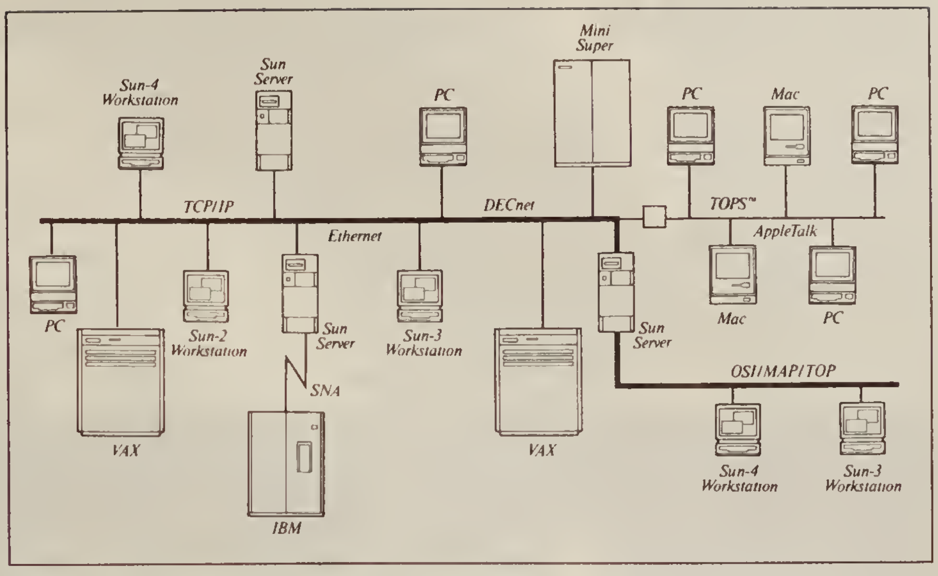

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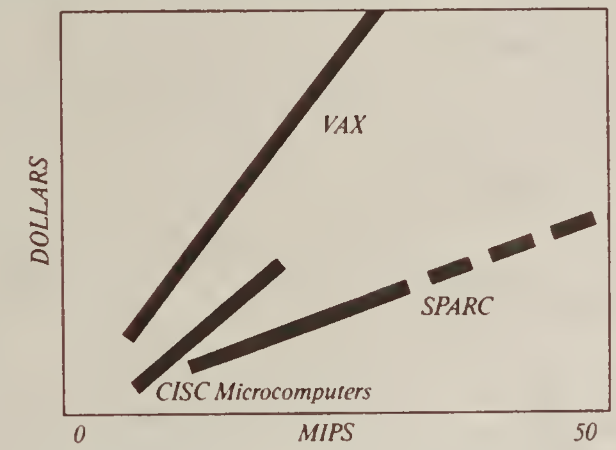

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‘Making it Big’ means more than bits and bytes

Making it Big in Data Processing
By Robert Half

This easy-to-read guide is aimed at those aspiring to enter or rise in the world of DP. Robert Half, chief of the international accounting and DP recruiting firm that bears his name, stresses throughout the book that there is much more to success than just technical knowledge.

Half observes that while computers are becoming increasingly important to business, “the computer tail no longer wags the management dog.” Technological expertise is still necessary, he writes, but it is the application of technology that counts in business today.

The increasing role computers play as they are applied to more business needs dictates that, while technical skills are vital for entering the field and growing within it, “loftier DP management jobs demand a well-rounded individual,” Half says. Conversely, the career potential for anyone in general business increases with a command of DP.

The book covers self-assessment, education, job hunting, attitudes and strategies for success, management and self-employment. “Where you choose to stop is an expression of your individuality and personal needs,” Half writes. Those aiming to leap into the highest echelons of management “are entertaining those dreams at a vital point in the history of DP.”

Hardcover, $17.95, 286 pages, ISBN 0-517-56580-3, by Crown Publishers, Inc., New York.

BOOKS IN BRIEF

In-House Publishing in a Mainframe Environment
By P. C. McGrew and W. D. McDaniel

Unlike many books on desktop publishing, this one provides concise answers to the many general and technical questions involved in document production using an IBM 370 mainframe and the support staff already in place in many corporations.

Hardcover, $34.95, 296 pages, ISBN 0-02-948982-2, by MacMillan Publishing Co., New York.

The Right Choice: A Complete Guide to Evaluating, Selecting and Installing MRP II Software
By Christopher Gray

Gray provides detailed answers on how to make manufacturing resource planning software work, addressing myths associated with its implementation, showing ways to define system requirements and describing how to negotiate a software vendor contract.

Hardcover, $39.95, 258 pages, ISBN 0-939246-09-0, by Oliver Wight Limited Publications, Inc., Essex Junction, Vt.

The Arthur Young Practical Guide to Information Engineering
By Arthur Young Information Technology Group

This book presents an applications-oriented framework for systems planning and development using information engineering, a process by which business information needs are analyzed and appropriate systems are designed and implemented to address those needs.

Hardcover, $32.95, 182 pages, ISBN 0-471-62920-0, by John Wiley & Sons, Inc., New York.

Manufacturing Intelligence
By Paul Wright and David Bourne

Exploring the changing nature of manufacturing, this book bridges manufacturing and computer science by showing how computer-integrated manufacturing and expert systems can be used to create machines that are autonomous and unattended.

Hardcover, $37.95, 352 pages, ISBN 0-201-13576-0, by Addison-Wesley Publishing Co., Reading, Mass.

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SOFTWARE & SERVICES

SOFT TALK

Charles Babcock

Cobol 85: If it ain't broke . . .

Two things strike this observer about the current debate over Cobol 85 addenda.

One is that the addenda process is being layered on top of the general revision process of the language, probably to the detriment of that larger activity. And while anyone may comment on an addendum during the public review period, users are inadequately represented in requesting what they want from the standard-setting process as a whole.

Whatever the benefits of an addenda process, it is going to absorb the time and concentration of the X3J4 Technical Committee as the group formulates revisions, submits them for public review and adapts them after taking public opinion into consideration. This investment in time and attention can ultimately contribute to the next full-scale revision of the language, but it is more likely to compete with that larger process.

Part of the task of standard setting, it strikes us, is to focus the attention of the best authorities on a set of revisions to the language. Authorities frequently disagree, as we have seen with Cobol, but they can often achieve a synthesis that can then command public support.

The addenda process fragments the public side of that pro-

Continued on page 30

Few takers for VM/XA

Users wary of communications hang-up

BY ROSEMARY HAMILTON
CW STAFF

IBM's long-awaited release of a production version of its VM/XA operating system is just weeks away, but some users at large shops are saying, "No thanks."

The initial release, VM/XA SP Release 1, which is scheduled for shipment in March, does not have native support of IBM's Systems Network Architecture (SNA). As a result, some users said they are planning to either not install this release or install it for test purposes only.

Native SNA support is expected with VM/XA Release 2, scheduled for shipment in early 1989.

"XA, as we perceive it, isn't viable until SNA is available," said Guy Goubeaux, director of technical support at the Salt River Project, a utility company based in Phoenix. "SNA [support] is at least a year away, and until then, it holds no interest for us."

In a recent interview, Lois Dimpfel, manager of the IBM Kingston Programming Center, noted that native SNA support is a top priority for VM/XA. "One of the driving requirements on the VM/XA operating system is that delivery of that SNA native capability is as soon as possible," she said.

Last week, an IBM spokesman said there have been no changes made to the VM/XA SP shipping schedule.

A critical condition

The native SNA support is critical at large shops, many of which are committed to this networking strategy. "We are an SNA shop. In the VM area, we have just under 1,700 users, and SNA is the way we support them," Goubeaux said.

"We'll see a lot of shops wait-

Continued on page 29

NASD offers traders instant market access

BY ALAN ALPER
CW STAFF

NEW YORK — The National Association of Securities Dealers (NASD) is offering IBM Personal Computer-compatible workstations with an application package to enable its members to automatically monitor all over-the-counter market information.

The workstations are expected to replace a 7-year-old network of Harris Corp. dumb terminals.

The software, developed by a NASD subsidiary, the National Association of Securities Dealers Automated Quotation, Inc. (NASDAQ), allows dealers to create their own data bases for market-minding activities and handles local communications functions, spokesmen said. NASDAQ is continuously broadcasting all market information in compressed mode from its Unisys Corp. Model 1193 in Trumbull, Conn., to dealer workstations on its network.

The workstations will reportedly provide traders continuous access to market information, specifically on precise bid-and-ask prices. Currently, traders using Harris terminals have to repeatedly query the NASDAQ's mainframe complex for the most recent prices.

Continued on page 29

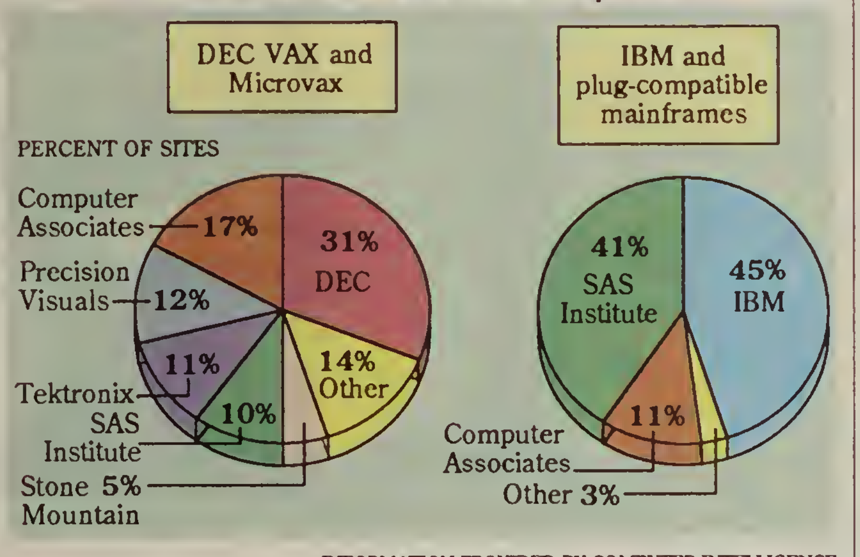
Inside

- Informix turns DBMS line into virtual multiuser data base. Page 29.
- Atre International sold to Computer Assistance. Page 30.
- Alis OA software package now available on VMS. Page 34.

Data View

Vendor market share of graphics software

VAX market shows more heated competition



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE
CW CHART

Pilot, Thorn join for data interchange

BY NELL MARGOLIS
CW STAFF

BOSTON — The U.S. market leader in executive information systems (EIS) and the international market leader in decision support systems (DSS) have joined forces to give users a software package that combines the statistical complexity of DSS with EIS's graphic simplicity.

Under terms of an agreement announced last week, Boston-based Pilot Executive Software, Inc.'s EIS packages and the Thorn EMI Computer Software, Inc. FCS decision support system will allow transparent data interchange between the Pilot data base and FCS financial models, according to Pilot Chairman David Friend.

Under the agreement, British giant Thorn holds exclusive European marketing rights to Pilot's EIS product line, and the companies will jointly market the Pilot line and Thorn's FCS DSS in the U.S.

Using the vendors' data interchange, a Pilot user who, for instance, wants to change an assumption in a query to ask, "How would it change cost projections for 1988 if the price of

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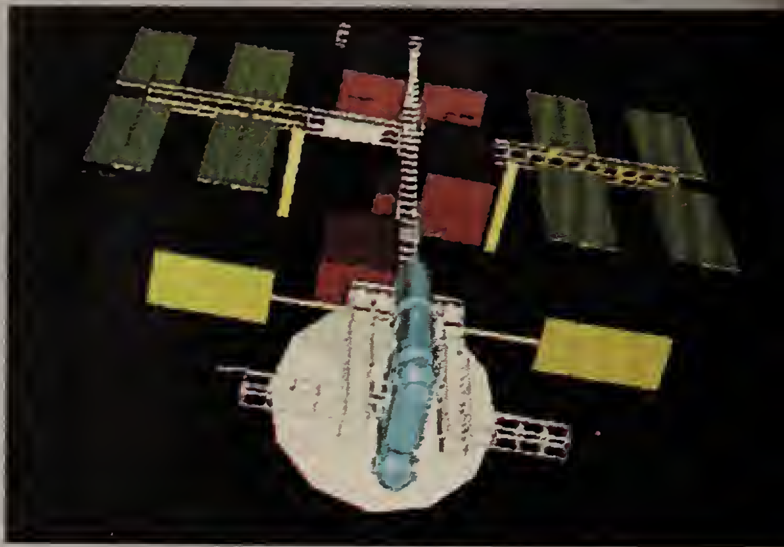

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Summing it up, she states, "By improving access to the supercomputer, Digital makes it easier for researchers to improve our quality of life. And our competitive edge in the world."

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Ring out the old, ring in the new

Informix VMS line expands to run programs over Decnet

BY NELL MARGOLIS
CW STAFF

MENLO PARK, Calif. — Informix Software, Inc. rang out the old year by turning its relational data base management system product line into a virtual multiuser data base.

Two software packages slated for shipment this quarter — Netstation and Netdbs — will allow applications created with Informix-4GL, Informix-SQL, Informix-ESQL/C and Informix Datasheet Add-In to run across Digital Equipment Corp. VAX and DOS-based personal computer networks via DEC's Decnet, the vendor said.

At the same time, Informix announced overall performance enhancements of all four of its VMS-based software packages as well as a VMS version of C-ISAM. Originally created for use in hierarchical data bases, C-ISAM is a lower level data-access method that complements SQL to provide high speed to the performance-intensive parts of applications, according to Informix senior product manager Gordon Smith.

Initially offered as a relational DBMS for Unix systems, Informix products moved onto the VAX line of processors last June, and the company continues its offensive into the VMS market with its networking offerings. The move did not require a major product rewrite, according to Smith.

"We designed all of our products with networking in mind from the beginning," Smith said.

The architectural divide

Informix's product line is based on a two-part architecture that separates the SQL engine, or back end, from the user interface, or front-end, tools. The division, Smith said, is natural for networking, as front-end data processing can be done on PCs while back-end data manipulation is handled by VAXs.

The new packages reflect the architectural divide. Netstation bundles Informix front-end tools with a network module to let users access remote data base back-end functions.

Netdbs adds Informix back-end tools to the Netstation mix, allowing the user the option of linking up with a network or flying solo.

Smith declined to quantify either the size of Informix's VMS user base or the percentage of company revenue attributable to the VMS product line.

Informix's Netstation is priced at $635 for Informix-SQL, $795 for Informix-4GL and $475 for Informix-ESQL/C. Netdbs is priced at $1,030 for Informix-SQL, $1,290 for Informix-4GL and $770 for Informix-ESQL/C.

Pilot, Thorn

CONTINUED FROM PAGE 25

oil were to double?" can trigger an FCS model without having to go through the modeling process.

The Pilot packages, which have links to IBM's Professional Office System and Digital Equipment Corp.'s All-In-1 office automation systems, bring users another benefit as a result of the FCS integration. "Since Pilot can talk right through FCS," Friend said, "Pilot users will have the advantage of FCS interfaces to data base systems including IBM's DB2, Adabas, Ramis and Focus."

Pilot software runs on DEC VAX and IBM mainframe and Personal Computer platforms. FCS operates on a wide range of mainframe and minicomputer systems including those from IBM, DEC, Hewlett-Packard Co. and Wang Laboratories, Inc.

DSS, Friend said, is an analytical tool that focuses on sophisticated economic modeling with traditional appeal to research and analysis professionals with programming experience. In contrast, EIS, with its emphasis on highly graphic user interfaces and easy-to-intuit organization, is targeted at nonprogrammer executives seeking bottom-line information.

The marriage of the two, Friend said, is aimed at "upper-middle-level executives — the people between the chief executive officer and the financial analysts who often end up having to assess great amounts of data to come up with important decisions quickly."

Cobol graphics tool to debut

GARDEN CITY, N.Y. — Computer Associates International, Inc. recently announced it will release a graphics tool for Cobol application development next month.

CA-Disspla Cobol is based on the graphics technology Computer Associates picked up with the acquisition of Issco a year ago.

The product will allow developers to fold graphics capabilities into Cobol code, resulting in applications that include charts and other graphic representations, Computer Associates said.

To incorporate graphics, users must follow a seven-step procedure, according to Terry Baker, a Computer Associates product marketing manager. The steps include a series of commands that bring the graphics environment to the Cobol application. For example, the commands call Computer Associates' graphics source code, identify data to be included in the chart and move it into the chart.

The amount of coding will vary depending on the complexity of the application, Baker added.

CA-Disspla will initially be available for the IBM MVS, MVS/XA and MVS TSO environments. Licenses will range in price from $13,000 to $30,000, depending on the system configuration.

NASD

CONTINUED FROM PAGE 25

"There is zero response time, since all the query information can be programmed from the workstation and resides on [the workstation's] disk," noted Randall Sampietro, a software engineer on the project.

NASD is offering the Unisys Personal Workstations 2 and the Tandem Computers, Inc. PSX series. Both come equipped with 512K bytes of random-access memory, a 25M-byte hard disk drive, a 1.2M-byte floppy and an Emulex Corp. communication card.

Sam Vail, Unisys's branch manager for the NASD account, said he expects that at least 85% of the 32,000 dealers using the Harris terminals will convert to micros during the next 18 to 24 months. So far, however, the conversion has been slowed by cost-cutting measures adopted by many institutions following the Oct. 19 stock market crash, he noted.

NASDAQ has also recently upgraded its capacity to automatically handle large blocks of stock. The association already has an automated system to handle transactions of less than 1,000 shares.

Traditionally, traders had to use the telephone to execute and confirm bid-and-ask prices on large transactions with market makers. On Black Monday, however, many over-the-counter traders were unable to make telephone contact with market makers and, therefore, could not verify with any degree of precision actual selling prices.

NASD spokesman Enno Hobbin said development work on an automated system for large transactions began before the stock market collapse but that delivery was accelerated in the aftermath of Black Monday.

VM/XA

CONTINUED FROM PAGE 25

ing for it," said Clare Fleig, director of systems research at International Technology Group in Los Altos, Calif. "The degree of willingness to go with Release 1 depends on how great their requirement for SNA is."

Fleig said she expects IBM to deliver the SNA support before the first quarter of next year, because "it's bound to have a big impact on their sales."

VM/XA SP received a warm reception from the user community when it was rolled out in mid-1987. Users viewed it as a big step for IBM to introduce a production version of VM for high-end systems. VM/XA SF was already available, but it is a limited implementation of an XA-oriented operating system. As a result, it was used primarily to guest other operating systems and as a conversion aid for users moving to MVS.

Despite supporting IBM's efforts, users also said they are disappointed in the first release of VM/XA SP because it will restrict their plans to move to a fully functional VM/XA environment.

At the Prudential Insurance Company of America in Roseland, N.J., the MIS department plans to install VM/XA SP Release 1 for test purposes, according to Wayne Robinson, manager of software systems.

"We plan to install it to shake it down," Robinson said. "We want to see what's there. That's a project for 1988. It'll give us breathing room for the next release."

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SOFTWARE NOTES

Computer Assistance buys Atre

Atre International Consultants, Inc. in Rye, N.Y., has been sold to **Computer Assistance, Inc.** in Hartford, Conn., a 21-year-old software consulting firm. Shaku Atre, the frequent commentator on fourth-generation languages and data base management systems, will remain president of what will continue to be known as Atre International, but Computer Assistance will use her as a special consultant to its 15 branch offices across the country.

"We have name recognition, and they have infrastructure," Atre said. Both Atre and Thomas McDonaugh, president of 600-employee Computer Assistance, are long-term IBM veterans. Computer Assistance's revenue was $40 million in 1987. Atre International had revenue of less than $1 million.

Chris Date will address the Feb. 5 meeting of the **Delaware Valley DB2 and SQL/DS Users Group** on the relational model and its implications. The meeting will take place at 9 a.m. at the Ramada Inn in Essington, Pa. Those interested in attending can contact the group at Suite 505, 3650 Silver Side Road, Wilmington, Del. 19810.

Babcock

CONTINUED FROM PAGE 25

cedure and threatens to create a series of distracting side debates. This might be an acceptable trade-off if the gains are periodic additions to the language, and Jerome Garfunkel, the X3J4 member from Litchfield, Conn., has been the best advocate of this positive side of the process.

Even without the addenda process, however, the five-year revision cycle for Cobol stretched out to 12 years between Cobol 74 and Cobol 85. With the addenda process, there is a possibility that full-scale revisions will take even longer as the process is sidetracked by debates over a specific addendum and the need to submit it for public review. Debate may soon have to focus on whether the next version of the language should be called Cobol 9X or Cobol 200X.

It is the belief here that the review process already takes too long and that Cobol is too important to be left to the Cobol authorities for more than a decade. The type of revision process advocated by Garfunkel is appealing, but it remains an open question as to whether it can be made to work expeditiously. And Garfunkel is right when he says the process should not be applied to Cobol 85 corrections.

Enter Larry Madison, data processing director at Travelers Insurance in Hartford, Conn., and protege of Joseph Brophy, who orchestrated the public comments on the initial version of Cobol 85 that sent it back to the drawing table.

Madison isn't beating the table with his shoe, but he is a skeptic of the addenda process and has taken a stand alongside Garfunkel, saying the addenda process should not apply to corrections. Normally, these two men are not found in the same camp.

Compiler makers overlooked

Madison is concerned that corrections are mandatory changes that must be adopted by compiler makers and that, therefore, the agreed-upon standard will change from Cobol 85 to Cobol 85.1, 85.2, 85.3 and so on. Any changes to the existing terms of the standard — as opposed to additions to the standard — will open the question of whether existing programs will run the same under a Cobol 85 compiler vs. a Cobol 85.1 or other corrected-version compiler.

The committee clearly wants to incorporate the minor corrections in Addendum Two as soon as possible, and as long as debate focuses on Addendum Two rather than the correction process as a whole, a majority can be found to support it. Committee members who voted for the correction addendum included representatives of Unisys, IBM, NCR, Ryan McFarland and Hewlett-Packard — all compiler writers.

But if attention could be shifted from the specific corrections to the long-term correction process, I think it would raise a howl of protest from users once they discovered they must live with a shifting standard. Among the five votes against taking this course, in addition to Madison and Garfunkel, were representatives of three compiler writers: DEC, Prime and Micro Focus.

As both Madison and Garfunkel point out, we have an alternative to incorporating addenda corrections. The X3J4 committee issues Cobol Information Bulletins (CIB), which could provide interpretations to clarify ambiguous and inaccurate rules every year or even semiannually.

Compiler writers would then be forewarned of what would change in the next full-scale revision of the language and could incorporate changes that had a minimal impact on the existing standard.

"The CIB would not be official. In a sense, it's a reference for compiler writers; an advance warning of things that will probably happen," Madison says.

This approach has its limitations as well, but it has the redeeming virtue of avoiding a shifting standard, and in the end, that is what users want.

Babcock is *Computerworld's* senior editor, software & services.

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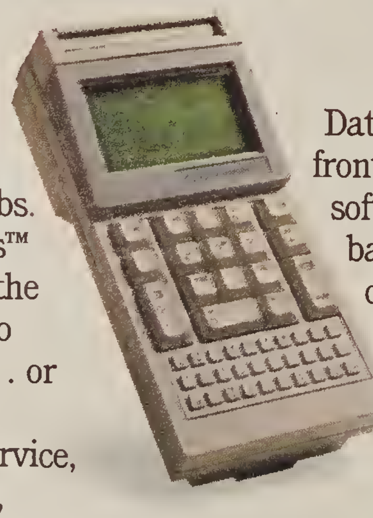

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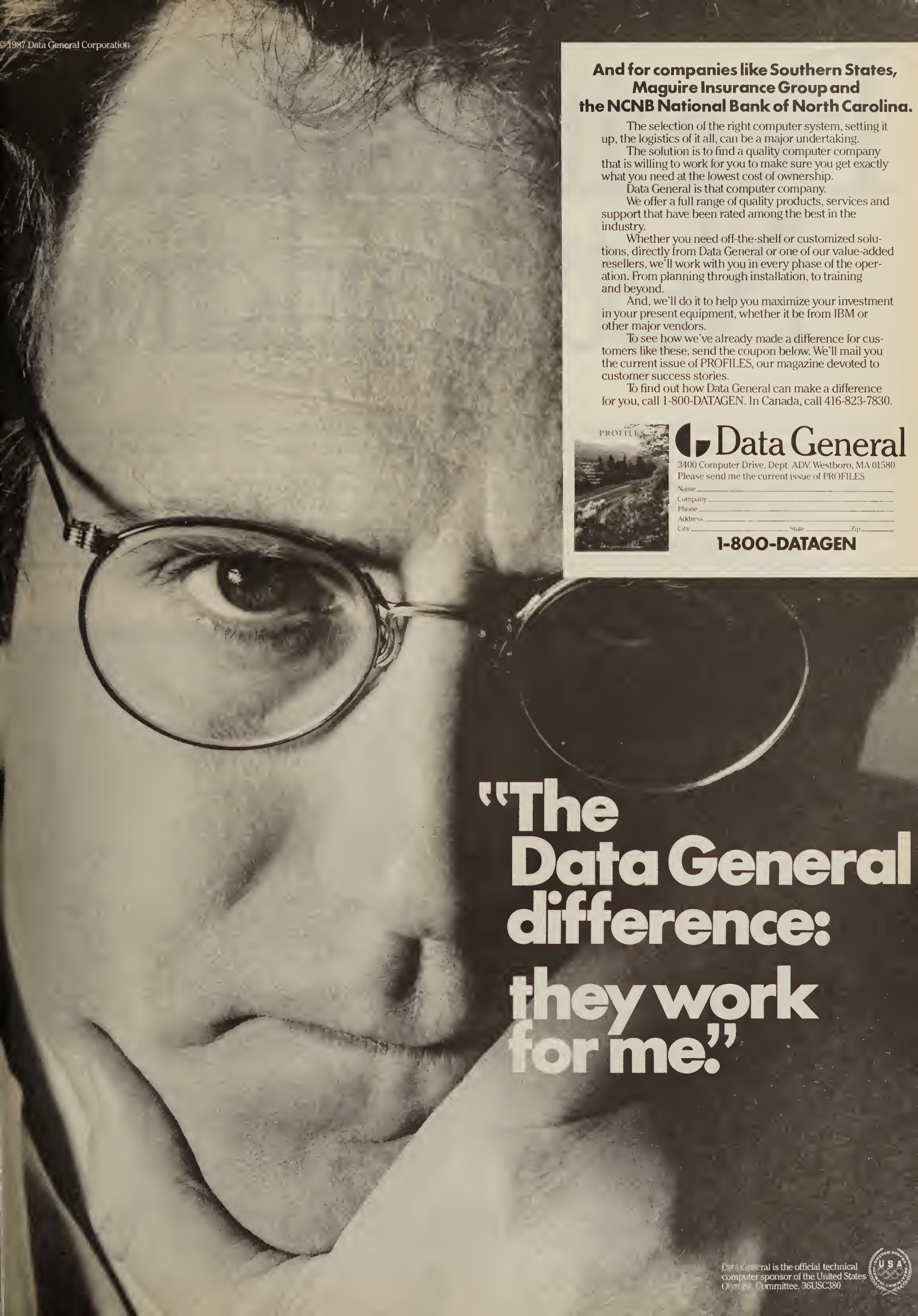
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NEW PRODUCTS

Systems software

Software Partners/32, Inc. has introduced **Jobsys**, a job management software system for Digital Equipment Corp. VAX/VMS systems.

Designed to handle recurring jobs and job dependencies — detached and in batch mode — Jobsys is said to be able to define the point at which a given job will be considered complete and specify that a job will run only when one or more other jobs are done.

The software works as a distributed system, the vendor said. It allows for job scheduling by time of day, week or month or at a given point in a process. Users can submit jobs to any node in a Decnet network hosting the package. In addition, jobs can depend on other jobs wherever located in the network.

Jobsys is priced from $3,000 for a single DEC Microvax II license to $10,000 for a site license.

Software Partners/32, Suite 880, 447 Old Boston Road, Topsfield, Mass. 01983. 617-887-6409.

Applix, Inc. has announced that its **Alis** office automation software package is now available on Digital Equipment Corp.'s VMS operating system.

Alis, which formerly ran only on Unix and derivatives, features such capabilities as multifont word processing, freehand drawing, business graphics, spreadsheets and data base management, according to a company spokesman.

The vendor said the product can now harness VMS's networking ability to provide electronic mail, meeting scheduling and work group information sharing. Alis can also link users working on differing hardware platforms and operating systems.

Alis on VMS is priced from $3,000 to $75,000, depending on system configuration.

Applix, 112 Turnpike Road, Westboro, Mass. 01581. 617-870-0300.

Applications packages

Scheduling software designed to run on personal computers and multiuser systems has been announced by **Computer Options, Inc.**

Ace Scheduling is said to feature formulas for job-shop capacity planning, including economic movement quantities, user-defined job priorities, forward and backward scheduling and critical ratios. The information can be generated in reports or graphics, on-screen or in hard copy form. Users reportedly can define capacity down to the individual work center. Temporary variances caused by overtime or machine downtime can also be formulated.

Pricing for the product ranges from $995 to $2,500.

Computer Options, 603 West St., Mansfield, Mass. 02048. 617-339-5515.

Prolib, Inc. has ported its **AutoPCB** program for printed-circuit board (PCB) design to Sun Microsystems, Inc.'s series of engineering workstations.

AutoPCB 5000 for Sun workstations features schematic capture, computer-aided interactive placement, autorouting, a parts library with more than 5,000 parts and postprocessors for artwork preparation and PCB fabrication. It integrates with Autocad from Autodesk, Inc.

AutoPCB 5000 is priced at $7,500.

Prolib, 624 E. Evelyn Ave., Sunnyvale, Calif. 94086. 408-732-1832.

Utilities

Updata Software Co. has ported its **DB/Proedit** ISPF-style editor for IBM DB2 tables to IBM's SQL/DS environments.

DB/Proedit for SQL/DS uses IBM ISPF or Xedit commands. Users can edit, create and load test data and can test embedded SQL with host variables, template new tables and indexes from existing definitions, edit in table or row format, perform system catalog queries and make global changes to tables, according to the vendor.

Annual leases for DB/Proedit are priced from $1,775 to $5,400.

Updata Software, 960 Holmdel Road, Holmdel, N.J. 07733. 201-946-2000.

Development tools

Precision Visuals, Inc. has enhanced the IBM VM/CMS implementation of its **DI-3000** graphics software tools package.

DI-3000 is used for the development of graphics applications, the vendor said. Features include full color, three dimensions, area fill and patterning, debugging aids and picture metafile. According to the vendor, the product is portable across different operating systems and supports non-IBM graphics terminals and hard-copy devices.

Enhancements include support for discontiguous save segments, dynamic memory allocation for segment storage and dynamic nodes, which permit runtime selection of output devices. DI-3000 can also be shared among users in a time-sharing environment, according to the vendor.

DI-3000 is priced from $20,500.

Precision Visuals, 6260 Lookout Road, Boulder, Colo. 80301. 303-530-9000.

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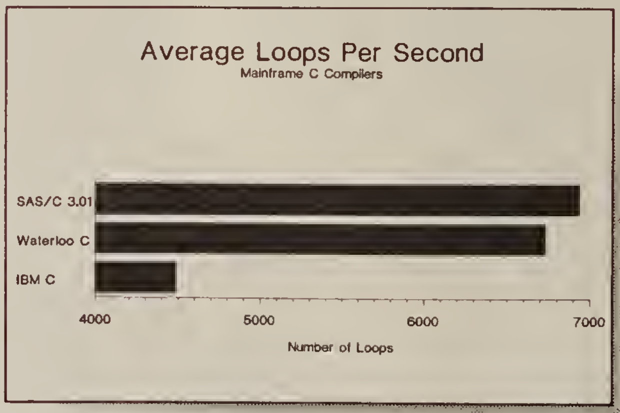

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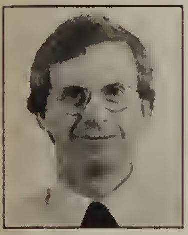
Compaq cuts lead the way



Up to ramping speed. With its recently increased manufacturing capacity, it looks like Compaq is better able to meet demand and has decided to cut prices on its Intel 80286-based product line. The company has dropped the price of its Deskpro 286 line by 10%, bringing the cost of the Model 1 to $2,699 from $2,999, the Model 20 to $3,599 from $3,999 and the Model 40 to $4,499 from $4,999.

This round of price cutting could inspire some similar actions from competitors, including IBM, as competition in the 286-based market heats up.

There have been rumors that IBM will soon cut prices on the Personal System/2 Model 50, which has been selling well of late. However, an IBM spokeswoman last week said the company has no plans to reduce prices on the Model 50.

In fact, she reminded us that IBM raised the price of the PS/2 Model 60 back to its original level on Jan. 1. However, one dealer told us he continues to sell the Model 60 at its reduced price without any harassment from IBM.

Continued on page 39

Oracle engine revs up for 1-2-3

BY ED SCANNELL
CW STAFF

BELMONT, Calif. — Oracle Corp. recently released a data base add-in that reportedly allows Lotus Development Corp. 1-2-3 users to manage data in large or multiple work sheets by giving them access to Oracle's line of host data base management systems.

Christened Oracle for 1-2-3, the product includes the add-in software, the full Oracle distributed relational engine, free support for 90 days and a tutorial. Oracle said the product is priced at $199.

"In using Lotus 1-2-3 as a data base instead of a spreadsheet, 1-2-3 users are using a good tool for the wrong job. Lotus 1-2-3 is for analyzng data, not managing it," said Pete Tierney, Oracle's vice-president of marketing.

And now this update

The program's features include the ability to instantly update the data base by making changes to work sheet cells and to operate in protected mode on Intel Corp. 80286- and 80386-based systems. Full data integrity is provided as well as transaction management and recovery for data integrity.

Besides communicating with Oracle's host DBMSs, Oracle for 1-2-3 users can connect to IBM's DB2 data base located on mainframes and minicomputers.

An added benefit to the program is that it acquaints 1-2-3 users with SQL commands, which can be stored as 1-2-3 functions. Users can retrieve Oracle data through simple menu commands that are transparently converted to SQL statements. Users can also choose to type in SQL statements directly.

Tutoring session

Although the first 90 days of support are free, additional support packages are priced at $50 for three months and $150 for one year.

The company is also putting together a computer-based tutorial that allows users to learn the program at their own pace.

The program is intended to run on 286- and 386-based systems and requires 1-2-3 Release 2.01 and Microsoft Corp.'s MS-DOS 3.0 or higher, 640K bytes of memory, 896K bytes of extended memory, 5M bytes of hard-disk space and a floppy disk drive.

Oracle said it plans to ship the product Feb. 1 and that Oracle for 1-2-3 will be available through its direct sales force, value-added resellers and retailers.

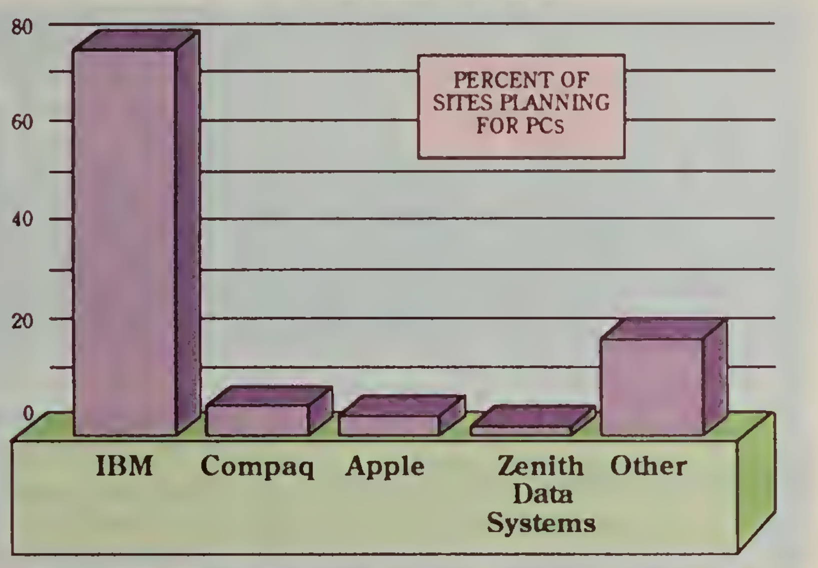
Inside

- Claris VP speaks out on Apple spin-off's goals. Page 37.
- Is Aldus's Freehand too good? Page 37.
- Arche Technologies adds 286-based PC. Page 42.

Data View

Mostly blue

Survey of Fortune 1,000 sites indicates heavy reliance on IBM for personal computers



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE

Lotus rewrites Manuscript

Aims to escape limits of scientific market niche

BY ALAN J. RYAN
CW STAFF

CAMBRIDGE, Mass. — In an effort to broaden the appeal of Manuscript, Lotus Development Corp. plans to announce today an overhauled version of the word and document processor.

Manuscript 1.0, released in December 1986, was targeted at scientific and engineering markets. Release 2.0, set to sell for $495, repositions Manuscript as a product for financial, government and work group applications as well as scientific and engineering areas. It is slated to begin shipping this quarter.

"I found it hard to get people to take a good hard look at [Manuscript] for the business applications that it does so well" because of its original positioning, said Garrett M. Hayes, personal computer coordinator at First Interstate Bancorp in Los Angeles.

Alpha-test users said last week that they are pleased with the changes, asserting that many of the new functions are necessary if Manuscript is to be a viable player in the expanded markets it is trying to corner.

Enhancements include macros, conditional merge and DOS

Continued on page 39

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SMALL TALK

William Zachmann

Demo enters PC derby

It is commonly claimed that the days of software start-up companies are over. Analysts claim that only large, well-funded operations have a chance for success.

The increased complexity of software requires big development staffs supported by big budgets. To get a product known requires big spending for promotion and advertising.

These dour observers stand in relation to Dan Bricklin's company, Software Garden, Inc., and to his Demo II program, like those who claimed that the flight of heavier-than-air devices did to the Wright brothers and their plane at Kitty Hawk.

Demo II, which costs $195, convincingly proves the gloomy prophets of big-money software to be dead wrong.

With no more resources than his own ideas and skills, and with the help of just one assistant, Bricklin has produced and is successfully marketing a product that is both imaginative and has much practical utility. Demo II is an indispensable tool for the rapidly increasing number of information systems professionals developing micro-based applications.

Demo II is the most useful tool available for prototyping serious IBM Personal Computer-compatible applications, whether they are used as the primary platform or simply as workstations for the user interface.

The program offers a powerful yet easy-to-use facility for

Continued on page 38

Claris developer aims to throw engineers' switches, throttle into Big Three

Apple Computer, Inc.'s software subsidiary Claris Corp. has set itself a lofty goal — to be the No. 1 Macintosh software company. This may be a high ambition for a start-up, but with Apple's clout, Claris is no ordinary start-up.

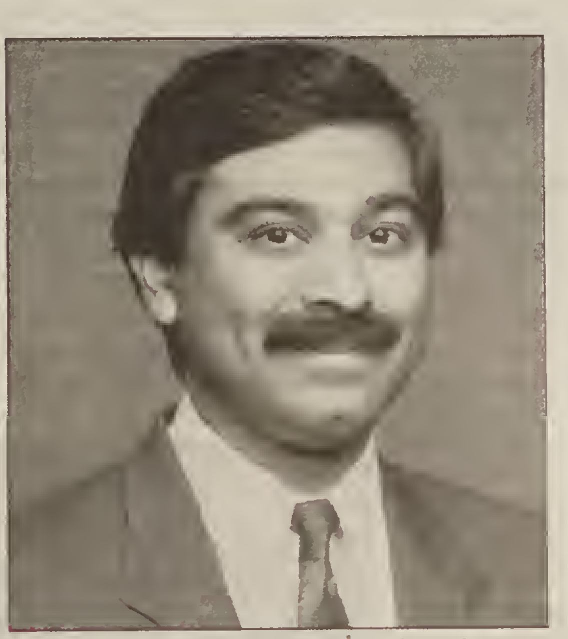
Claris commenced operation last year with $50 million in sales from Apple's existing products and has access to Apple's dealer network. But it faces a tough battle against the Big Three — Microsoft Corp., Lotus Development Corp. and Ashton-Tate Corp.

As vice-president of product development, it is Yogan Dalal's job to foster a creative environment among Claris's 15 software engineers while injecting the reality of the marketplace into the company's development efforts. The Xerox Corp. alumnus spoke to *Computerworld* senior correspondent Julie Pitta at the recent Macworld Expo in San Francisco, at which he contemplated the futures of the Mac operating system, OS/2 and Unix.

IN PERSON

How is Claris identifying market opportunities?
We're observing what companies like Apple are doing with their own business strategies. Apple has indicated it would like to get into the scientific and engineering markets as well as work group applications through Appletalk and now with the agreement between DEC and Apple. This gives us an indication of some general areas that will gain momentum.

Our goal is to discover within those markets what are good market opportunities that might start off as niche markets but will really grow like mad.



Dalal stops, looks, listens *in effort to find right direction for Claris.*

Another way is to understand what is happening to the industry as a whole. The distinction between workstations and personal computers is beginning to blur. [We must] try to independently identify the next confluence of technologies that will bring something like desktop publishing together.

Have you identified any specific categories?
The principal category that we've identified is smart forms. The form is a metaphor for doing business. Everyone is trained to use a form. We're starting off in a niche area, and we plan to expand it. Forms allow the front office and back office to communicate. That's what workstations and minicomputers do. Minis are traditionally viewed as back-office computing, and workstations are front-office machines.

The next area, which is similar but a little fuzzier, is data

Continued on page 38

Aldus's Freehand may be too good for the masses

BY STEPHEN JONES
CW STAFF

Aldus Corp. may find that its Freehand drawing tool offers too much of a good thing for a new segment of corporate users it has targeted. Offering commercial-like capabilities, the high-power drawing program could paint itself into a corner where the only interested customers are professional illustrators.

Freehand is being positioned as an add-in for Aldus's popular Pagemaker desktop publishing package, designed for use by both experienced graphic artists and business professionals who have little or no knowledge of illustration techniques. The idea is that both groups want original, professional-looking graphics.

But one analyst said the advanced graphics tool, with its logarithmic fills and seven levels of magnification, might be too much for an inexperienced user to handle.

"I don't think managers are looking for something this powerful; it may be beyond what they need," said Ed Wong, an analyst with Dataquest, Inc. in San Jose, Calif.

Positioned against Adobe Systems, Inc.'s Illustrator, Freehand costs $495 and is on the verge of shipping, according to Aldus. The product runs on Apple Computer, Inc.'s Macintosh Plus, Mac SE and Mac II, with two 800K-byte disk drives or one hard disk recommended. Output can be sent to any Adobe Postscript-compatible printer.

Freehand

Price: $495

- Displays up to 256 colors on a Macintosh II color monitor
- Requires a Mac Plus, SE or II
- Requires two 800K-byte disk drives or one hard disk
- Requires a Postscript-compatible printer.

Freehand was developed by Altsys Corp. in Plano, Texas, and acquired by Aldus last year to be a logical Pagemaker add-in.

Beta-test users agreed that appealing to corporate America will be a hard sell for Freehand.

"This is a sophisticated artist's tool that won't turn a nonartist into an artist," said Larry Baca, a beta-tester and president of Information Arts, a design consulting firm in Sacramento, Calif. "Like any graphics software, the user shouldn't expect the computer to give him graphics design skills."

Aldus President Paul Brainerd admitted that the education of potential customers is a hurdle for the Seattle-based company. "As we add more and more capabilities, a real challenge is, How do we bring a user up to speed on

Continued on page 39

Massive memory may escape vaporware list

BY ALAN J. RYAN
CW STAFF

SUNNYVALE, Calif. — Massive memory that will fit in a pocket will not be on anyone's vaporware list this fall. That is if Verbatim Corp. releases its 50M-byte 3½-in. optical disk as planned.

The company said its erasable single-sided disk and half-height drive are aimed at the workstation user who finds himself in need of more storage space or needs transportable data.

More storage may be necessitated by such memory-intensive applications as desktop publishing and Apple Computer, Inc.'s Hypercard, as well as capacity-consuming operating systems like Unix and IBM and Microsoft Corp.'s OS/2, according to Chandran Cheriyan, marketing manager of magneto-optic drive and media at Verbatim.

"As you get into applications that require more capacity, like medical imaging applications where CAT scans and X-rays need to be stored, the need for that capacity will continue to grow," Cheriyan said. Because it is erasable, the 3½-in. optical disk will not run out of capacity like a fixed drive would, he added.

In the past, media removability was important in the government and financial sectors, Cheriyan said, because users wanted the ability to lock up their sensitive data.

While that remains true today, transportability is also important so the disk can be shared between multiple systems. Cheriyan added that the technology can be designed into portable computers.

Prices of the Verbatim drive would initially be 25% to 50% higher than comparable Winchester disk drives, Cheriyan said, but he added that prices would likely drop as production is ramped up. The disk will cost approximately $100, he said.

Disk access time for write operation will be less than 70 msec, including latency. For read operation, access time will be less than 50 msec, according to Verbatim. Data transfer rate is reportedly more than 1M bit/sec.

Highflier

Because the optical head in the drive flies more than one millimeter above the surface of the rotating disk, a greater distance than the flying height of a head in a Winchester drive, the possibility of head crashes in the erasable optical drive is reduced, the company said.

Since the disk is single-sided, there is a possibility that Verbatim will bring out a 100M-byte disk in the future. "Most people say the current capacity is sufficient," Cheriyan said, "but I think once the product gets to the marketplace, people will start needing more capacity."

Eastman Kodak Co., which owns Verbatim, is looking to optical technology as the wave of the future, Cheriyan said. "This could potentially be used in electronic photography. People have talked about a filmless camera, where images would be stored on a floppy disk, for years," he added.

Zachmann

CONTINUED FROM PAGE 37

creating a realistic interaction between the user and a hypothetical prototype system. Enhanced features in the new version include the ability to handle bit-mapped graphics images and IBM Enhanced Graphics Adapter and Video Graphics Array support and a host of new command actions.

The basic conceptual model used with Demo II is that of a number of screen image slides linked together to simulate the appearance of an application's screen as the user interacts with an application. Demo II makes it very easy to create a collection of screen images representing the look of the display screen at various stages of running a program.

Placing text on the screen, drawing lines and boxes, creating menus and making graphics displays is easily done. Demo II also has a powerful overlay facility that makes it possible to construct a screen image out of standard templates, changing only those aspects needed for the particular image.

Various forms of menus, data entry forms, dialogue boxes and many other user interface options can be created with Demo II easily and rapidly. Designing screen formats and prototyping applications are examples of tasks that you can do with Demo II.

To put it formally, Demo II is a prototyping tool that treats the user display screen as a finite-state machine in which transitions between states are either timed or initiated by some action by the user at the keyboard.

Similar to Apple's Hypercard software for the Macintosh, Demo II has a somewhat different domain of application but works in a similar manner.

Demo II can also do things like spin a disk drive, make a sound or print something in addition to creating a prototype screen image.

You can look it up

Demo II's documentation is a great example of how to do it right. The 218-page manual should be studied carefully by anyone who wants a lesson in how to produce first-rate documentation. It provides concise, informative, alternative yet complementary views of the program. The Overview chapter in particular, which explains the basic architecture and function of the program, should itself be a model for all documentation on the market.

It also has an excellent on-line facility that includes a tutorial and Read Me information. It uses the facilities of Demo II to do the job, making it an example of effective use of the program.

Demo II is living proof that intelligently designed software can succeed without millions of dollars of development and advertising funds up front.

Zachmann is vice-president of research at International Data Corp.

Claris

CONTINUED FROM PAGE 37

bases. We don't have specific plans, but it's an area we're interested in. The third area is products that we have, such as Macwrite and Macdraw. We plan on evolving these products in the market segments they exist in. For instance, we'll look at word processing and graphics and see how it applies in a work group.

As a developer, who has influenced you most?

There are a number of people who have played a major role in my thinking. People like David Lidell, who's at Metaphor, Charles Xerbe at Metaphor and Bob Metcalfe. They didn't necessarily influence my opinions on workstation applications but they did in terms of development philosophy. There are other people I admire, like John Warnock and Ed Taft at Adobe, for their technical brilliance. I admire Bill Gates and Steve Jobs for their vision and persistence.

Compare the Mac operating system with OS/2. Why do you feel Mac OS is a superior development platform?

OS/2 has a lot of power that one used to think of as being part of the minicomputer world but now is available to microcomputers. I think OS/2 is a powerful operating system but, like most operating systems, it's on a technology curve.

Right now, if you compare the Macintosh operating system to OS/2, it might be deficient in a few areas, like multitasking. But it's had a generation or two of work done on it to make it faster, more reliable and, most important, to make the display parameters better.

What role will Unix play on the desk top?

I think Unix is a very powerful operating system. It grew out of the minicomputer environment and, therefore, has a lot of power and obstacles that make it slow and sluggish. But that's changing.

How will DEC and Apple's arrangement impact Claris?

We're excited about it. It makes our thrust in work group applications in multivendor environments very durable. When you talk about the plumbing necessary to connect workstations and minicomputers, the Apple-DEC announcement will ensure that this plumbing becomes available so that we can concentrate on the applications.

Freehand

CONTINUED FROM PAGE 37

the product?" he said.

In an effort to make Freehand easier to use, Aldus includes a tutorial disk that takes beginning users step by step through fundamental illustration procedures. Designed by Chicago-based Macromind, Inc., the tutorial starts with a how-to for drawing stick figures and moves on to more complicated graphics.

"People are kind of stymied when they first see those tiny Bezier dots, but once they learn how to use it, they really take off," said Judy Suttcliffe, a graphic artist in Santa Barbara, Calif., who is beta testing the product.

> ALDUS IS NOT relying solely on Freehand to win over a bigger chunk of corporate America.

Advanced users can follow instructions on 10 design flash cards that explain everything from graduated radial fills to how to transform an object through scaling, rotation and skewing.

With Freehand, users can draw basic shapes and Bezier curves by hand. Special effects include graduated radial, linear and logarithmic fills at any angle as well as the ability to define starting and ending colors for graduated fills.

Freehand has a unique text capability that automatically places a line of text along a curving path defined by a user. Other text features include automatic or manual kerning and variable letter and word spacing.

If those capabilities are too complicated, users can start with basic drawing functions and then move to more advanced effects as they grow more comfortable with the program.

Aldus is not relying solely on Freehand to win over a bigger chunk of corporate America, but it seems clear that the company will have to offer more low-end packages if it hopes to appeal to a wider base of users.

Scannell

CONTINUED FROM PAGE 35

The Compaq price cuts leave the firm's 20M-byte Model 20 only $4 pricier than a comparable Model 50.

Will they take phone orders now? Lotus's agreement with The Charles Schwab Corp. to jointly market Signal is a good move for Lotus. Since the company repositioned Signal from a corporate product to one for individual investors — something Schwab specializes in — the alliance makes a lot of sense. Signal's success in the corporate market has been somewhat less than spectacular.

Break out the Black Flag. It apears that Ashton-Tate had a little trouble stepping on a bug in its Dbase Mac program recently. The bug, which prevents users from copying all relevant records into an index, was first detected last month. Ashton-Tate promised to put a patch on Compuserve as well as mail out a disk to registered users. By the end of the year, users still hadn't received the fix. As it turns out, they hadn't received it because the indexing function on the patch didn't work either. Two weeks later, the company removed the old patch and replaced it with a new one. Ashton-Tate also sent out disks containing the new patch last week to registered users.

Speaking of bugs. Seven out of 10 users experienced a system failure last year, says the Business Products Consulting Group, a market researcher. According to a survey conducted by the company, users without a service contract can expect to wait an average of five days before the problem is fixed. Repairs cost users an average of $257 per failure, according to the study.

Scannell is *Computerworld*'s senior editor, microcomputing.

Lotus

CONTINUED FROM PAGE 35

exit, said Alan Minard, senior product manager of document products at Lotus. Other added features include a spelling checker, a thesaurus, libraries, counters, an integrated outliner and markers that replace the Back Slash command facility of Release 1.0.

Users can import and export files from other word processors either through ASCII files or IBM's Document Content Architecure or by using file-conversion modules put out by third parties, Minard said.

Minard also said Lotus has improved the preview function within the editor so pages can be seen before they are printed. He said Lotus has also added more flexible headers and footers. Work sheet information can be imported automatically. "That's going to make some of the things users do ridiculously easy," First Interstate's Hayes said.

The function will allow users to set up financial reports in advance and then plug in the latest financial figures just minutes before printing the document, according to Lotus.

Current Manuscript users can upgrade to Release 2.0, when it is available, for $75. Users who have purchased Release 1.0 since Dec. 1 can upgrade for free.

What ISDN is doing for McDonald's data networking capabilities is no small potatoes.

When McDonald's Corporation took a hard look at its telecommunications needs a few years ago, it saw 9400 restaurants in 46 countries, served by more than 20 networks. And a new restaurant opening every 17 hours.

McDonald's needed a telecommunications system that could grow with it, but one simple enough that the company could concentrate less on telecommunications and more on talking to customers.

The solution: the nation's first customer application of ISDN, the Integrated Services Digital Network, made possible by the cooperation of Ameritech's Illinois Bell and AT&T Network Systems.

McDonald's will use ISDN to send voice, data and video over ordinary telephone lines simultaneously. An AT&T 5ESS™ switch at Illinois Bell will support digital phones, integrated voice/data terminals, facsimile, voice mail, host access and modem pooling, giving McDonald's a real competitive advantage in its data networking capabilities.

"In business language, this means we're going to do an even better job for the 30 million customers that we serve every day," said Bonnie Kos, McDonald's Vice President of Facilities and Systems.

"ISDN provides an information outlet to every workstation, thereby eliminating time-consuming and costly wiring, as well as enhancing messaging and network control capability."

Thanks to ISDN, McDonald's will enjoy better customer service, more current market information, better tracking of product promotions, more efficient inventory control, and reduced administrative workloads.

Ultimately, higher level applications of ISDN on the public switched network will replace most of the company's myriad networks, linking all its offices and restaurants around the world.

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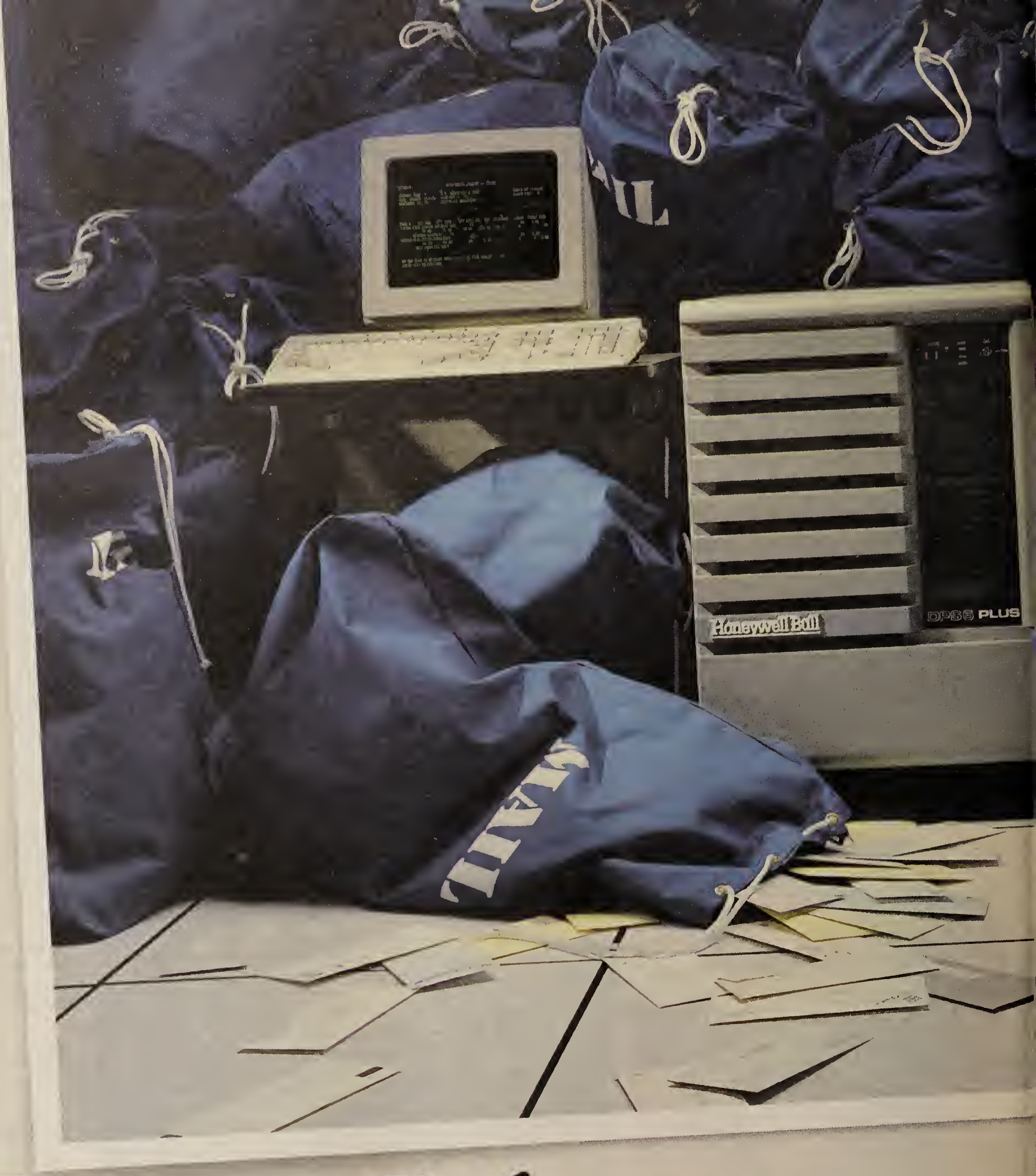

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NEW PRODUCTS

Systems

An Intel Corp. 80286-based personal computer was recently announced by **Arche Technologies, Inc.**

The **Rival 286** offers clock speeds of 8 and 12 MHz; 640K bytes of random-access memory on the motherboard, expandable to 16M bytes; a 200W switching power supply; six 16-bit and two 8-bit expansion slots; one parallel and two serial ports; an open Intel 80287 socket; one 1.2M-byte 5¼-in. floppy disk drive; and a 101-key keyboard. It also features a 14-in. amber phosphor flat-screen display with a tilt-and-swivel base.

The Rival 286 is priced starting at $1,795.

Arche Technologies, 745 High St., Westwood, Mass. 02090. 617-461-1111.

Software applications packages

A stand-alone personal computer-based version of **Automate** electronic-design software has been announced by **Royal Digital Systems, Inc.**

Automate includes schematic capture, simulation and printed-circuit layout. Other features include an operating system-independent data base manager; a library featuring electrical information and graphics-oriented information; and built-in expert system analysis.

Automate for Microsoft Corp. MS-DOS-based systems is priced from $5,700.

Royal Digital, 3600 W. Bayshore, Palo Alto, Calif. 94303. 415-858-0811.

Languages

An **Ada compiler** for IBM's Personal System/2 Model 60 running under DOS has been announced by **Alsys, Inc.**

The compiler is a version of the company's validated V3.2 Ada compiler for the IBM Personal Computer AT and compatibles. The version supports such programming tools as Alsys' Adaprobe debugging and viewing utility as well as cross-referencing, reformatting and recompiling tools.

The PS/2 compiler system includes a 4M-byte PS/2 memory board. It costs $2,995.

Alsys, 1432 Main St., Waltham, Mass. 02154. 617-890-0030.

Software utilities

A personal computer program designed to load data into existing Lotus Development Corp. 1-2-3 and Symphony spreadsheets has been announced by **Research & Planning, Inc.**

In2lot is said to load data into existing spreadsheets by matching labels in an input file to labels in the spreadsheets. Data and formulas already in the spreadsheet are not erased, the vendor said. Individual users can share the same input file for different spreadsheet formats and layouts.

In2lot is priced from $100 to $600.

Research & Planning, Suite 2323, 222 Third St., Cambridge, Mass. 02142. 617-547-5061.

Development tools

An IBM Personal Computer-based version of the dictionary-driven **Magec** Cobol application development system has been released by **Magec Software**.

PC Magec operates under IBM's PC-DOS or Microsoft Corp.'s MS-DOS using the Realia Cobol compiler from Realia, Inc. It is said to allow development of full-function applications on the PC. It includes IBM 3270 emulation and VSAM simulation as well as security and audit trails, on-line documentation, Help key support, data editing, inquiry, windows and browse.

Stand-alone PC Magec costs $9,000. As a workstation for mainframe Magec, prices range from $500 to $1,000.

Magec Software, P.O. Box 260319, Plano, Texas 75026. 214-248-0823.

NEW AT MACWORLD EXPO

A 328M-byte disk drive for the Apple Computer, Inc. Macintosh Plus, Mac SE and Mac II was announced by **Priam Corp.**

Called the **Model EM330**, the Winchester disk drive offers a seek time of 20 msec, a built-in power supply, an interface cable, a driver, utility software and installation and user manuals. It connects to the Macintosh Small Computer Systems Interface (SCSI) port and has a second SCSI port for connecting to other peripherals.

The EM330, part of the Macdisk family of disk drives, costs $4,895. Priam, 20 W. Montague Expwy., San Jose, Calif. 95134. 408-434-9300.

Layered, Inc. announced nine software products for the Macintosh:

Insight Expert Time Billing costs $595; **Insight Expert Inventory** is priced at $595 for the single-user version and $895 for the multiuser version; **Insight Expert Multiuser Accounts Receivable** costs $895; **Insight Expert Multiuser Accounts Payable** is priced at $895; **Insight Forms Design** costs $149; **Insight Export** is priced at $149; **Front Desk Multiuser** costs $99 per user; and **Notes for Ready, Set, Go** is priced at $79.

Layered, 529 Main St., Charlestown, Mass. 02129. 617-242-7700.

Desktop Help, an on-line task-oriented documentation tool for use with the Macintosh, was introduced by **Help Software, Inc.**

Desktop Help is priced at $395. Help Software, 10659-A Maplewood Road, Cupertino, Calif. 95014. 408-257-3815.

A communications software program designed to allow Macintoshes to access the Compuserve Information Service was announced by **Compuserve, Inc.**

The **Compuserve Navigator** adapts Compuserve to the Macintosh with pull-down menus and dialog boxes. Features include an interactive terminal mode and compatibility with Compuserve's version of the B protocol for file transfers and Compuserve's Graphics Interchange Format.

Compuserve Navigator costs $59.95. Compuserve, P.O. Box 20212, 5000 Arlington Centre Blvd., Columbus, Ohio 43220. 614-457-8600.

Eastman Kodak Co. introduced a portable LCD projection pad designed for use with the Macintosh family.

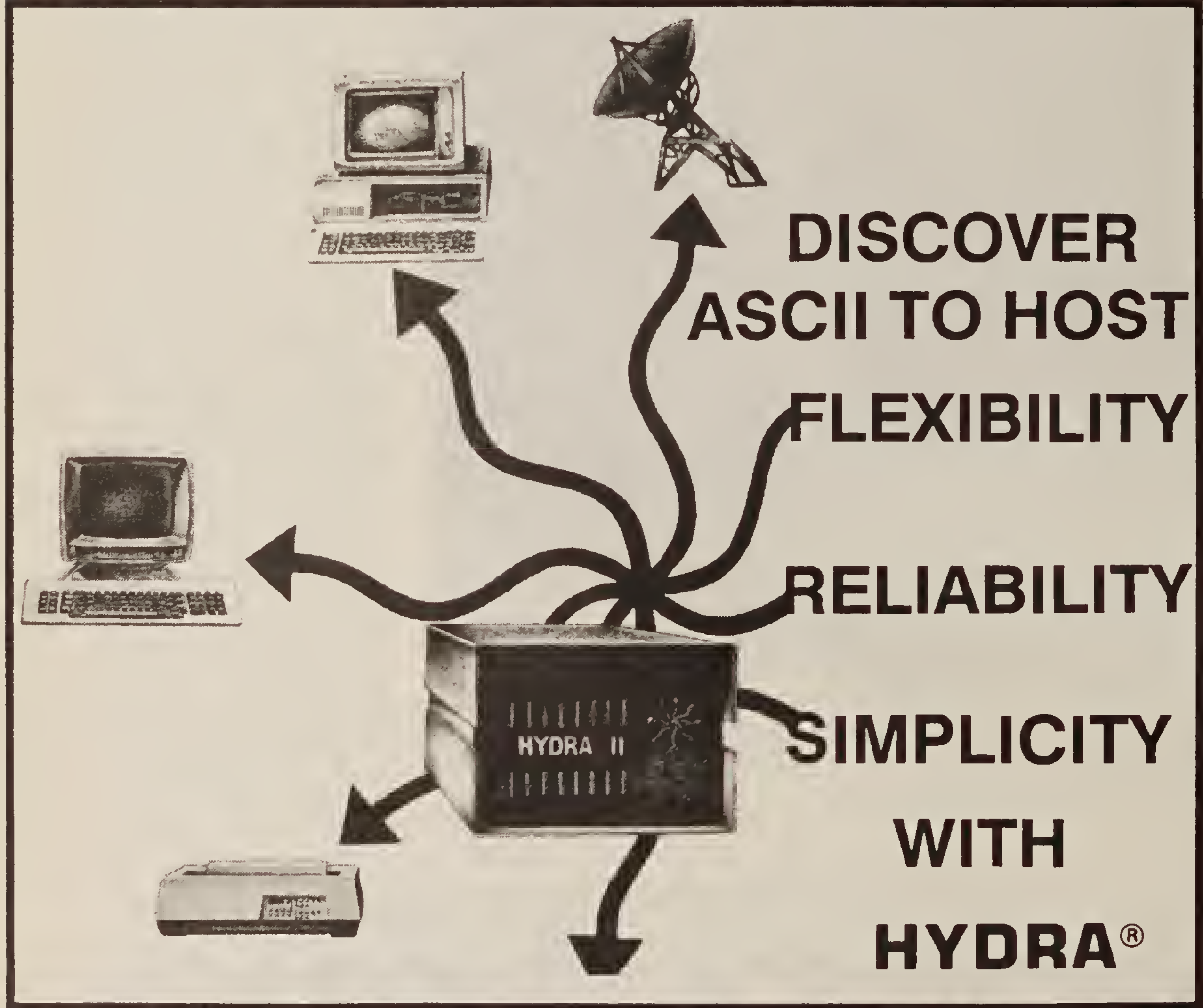
Intended for use in displaying large-screen electronic images for desktop presentations, the **Datashow HR** projection pad offers a resolution of 512 by 342 pixels. It works with any transmissive overhead projector, the vendor said, and such desktop presentations software as Microsoft Corp.'s Powerpoint.

The Datashow HR costs $1,595. Kodak, 343 State St., Rochester, N.Y. 14650. 716-724-3169.

A family of backup tape drives designed for Macintosh computers was introduced by **Irwin Magnetics**.

The drives feature Macintosh-style icons such as pull-down menus and windows; embedded servo technology; multiple icon-driven back up-and-restore options; the ability to back up data files over Macintosh local-area networks such as Appleshare; and an operating rate of 2M byte/min.

The 40M-byte backup tape drive costs $1,395. The 64M-byte model costs $1,595. Irwin Magnetics, 2101 Commonwealth Blvd., Ann Arbor, Mich. 48105. 313-996-3300.



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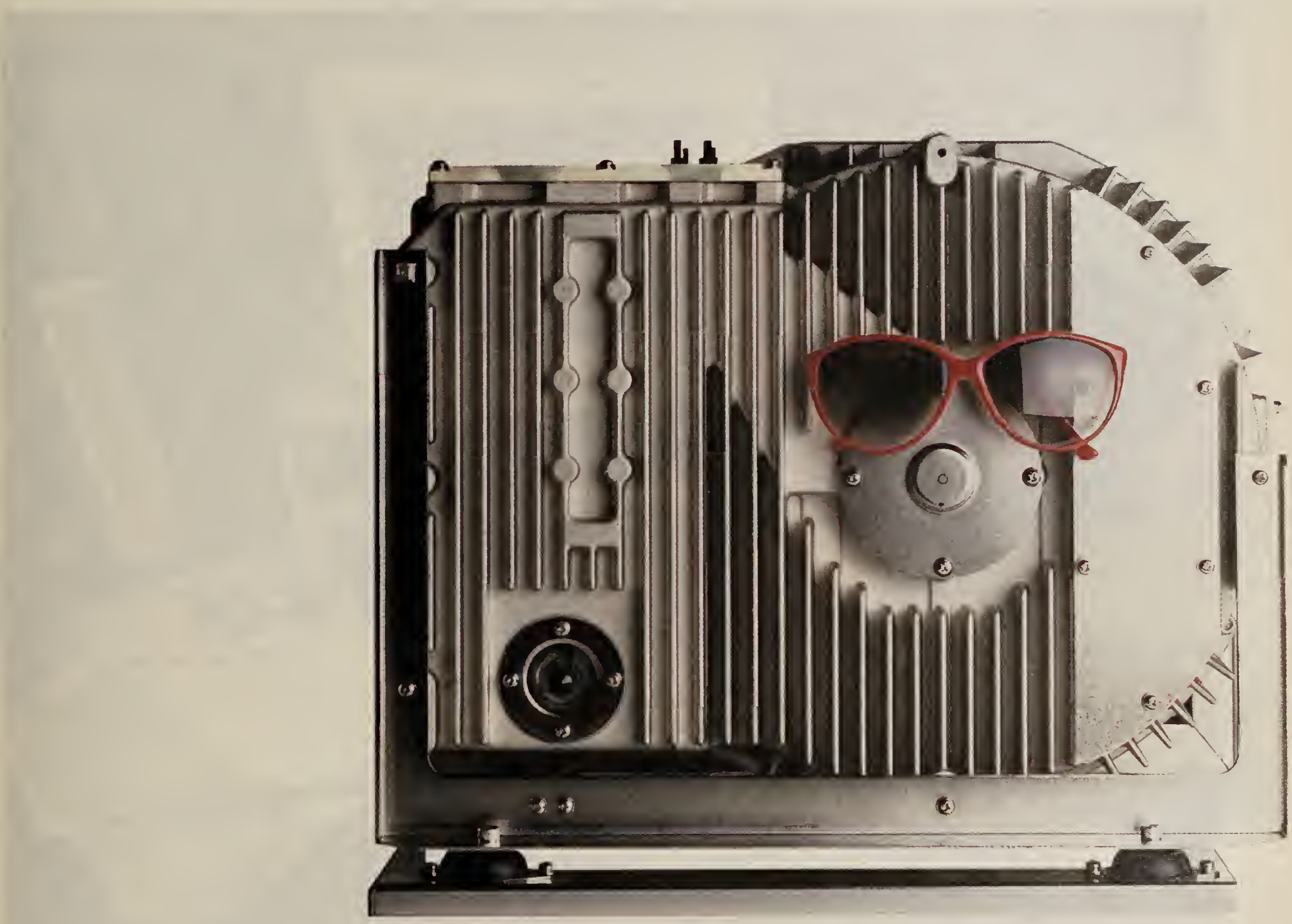

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   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other ______
   - 95. Vendor: Other ______

   (Please specify)

2. **TITLE/FUNCTION**

   IS/MIS/DP MANAGEMENT
   - 19. Vice President Asst VP
   - 21. Dir., Mgr., Suprv IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv of Operations Planning Adm Services
   - 23. Dir Mgr Suprv Analyst of Systems
   - 31. Dir Mgr Suprv of Programming
   - 32. Programmer Methods Analyst
   - 35. Dir Mgr Suprv OA/WP
   - 36. Data Comm Network/Systems Mgt

   OTHER COMPANY MANAGEMENT
   - 11. President Owner/Partner General Mgr
   - 12. Vice President/Asst VP
   - 13. Treasurer, Controller Financial Officer
   - 41. Engineering Scientific R&D, Tech Mgt
   - 51. Sales/Mktg Mgt

   OTHER PROFESSIONALS
   - 60 Consulting Mgt
   - 70 Medical Legal Accounting Mgt
   - 60 Educators Journalists Librarians Students
   - 90 Others ______

   (Please specify)

3. **COMPUTER INVOLVEMENT** Types of equipment with which you are personally involved either as a user, vendor, or consultant
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F No Computer Involvement

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Small vendors can be better

It worked for Martha Batorski. Maybe it can work for you.

Not long ago, Batorski, manager of office automation at Los Angeles-based Orion Pictures, was involved in the selection process for a network supplier.

Orion wanted to use the existing twisted-pair wiring in its building since it was going to move out within a year. It also required personal computer access to its IBM 4381 mainframe, as well as a communications link to its Manhattan offices.

The usual heavy hitters — IBM, DEC and Wang — threw their hats in the ring. But none of them won the bid.

The contract went to NBI. That's right, little old NBI, the word processing guys. Who would have thought they knew anything about links and LANs?

As it turned out, the risk Orion took with NBI was well worth it. Internal surveys and technical testing showed that the network is running like a charm, and the nontechnical users now rely on the local-area network to access things like data bases.

Many MIS directors admit they are far too busy to deal with the smaller vendors, even if there are key advantages to their network in terms of savings and support. "We're a Big Blue shop," they say proudly. "We are leery about any other

Continued on page 49

3Com's file server checks in

Early users of 386-based 3Server/400 tout speed, but dealers pan 3+ Share

BY JAMES DALY
CW STAFF

Early users of 3Com Corp.'s 3Server/400 series file servers are lauding its speed, expansion capabilities and ease of use, but some dealers are greeting the machine with a considerably more tepid response because of dissatisfaction with 3Com's 3+Share network operating system.

The 3S/400, along with the more powerful 3S/401, are the latest entries into the burgeoning Intel Corp. 80386-based server market. Santa Clara, Calif.-based 3Com began shipping the 3Server/400 series on Dec. 28, 1987, positioning the products as higher performance alternatives to its Intel 80186-based 3Server3. The new servers have been in the hands of beta-test users since October.

The increased horsepower of the 400 series results from a 16-MHz clock rate, which is twice that of the 3Server3. "We're getting anywhere from 40% to 45% better performance," said Bob Weder, a 3Server3 user who beta-tested the machine for Wordlink, Inc. in Champaign, Ill. "We've also found a degradation rate that's one-tenth that of the 3Server3."

The server models come preloaded with file, print and start services as well as a name server. The 401 model also has a redundant processor that provides automatic backup if the primary processor fails.

The automatic initiation of various services is "a real plus for a novice user," said Chuck Heindel, a beta-test user at General Telephone Co. of Florida, based in Tampa. "It takes away the necessity for a small business to come in and have a consultant set up their system. All you have to do is plop it down, turn it on and go."

The 400 series can also handle more memory than the 3Server3. Both 400 series models come with 2M bytes of 32-bit memory that can be expanded sequentially to 16M bytes with the addition of 2M-byte cards. IBM's OS/2 and the OS/2 LAN Manager will require expanded memory.

The more the merrier

"The expansion slots address a big need in our shop: putting more users on the network," said Joe Krus, a beta-test user for Healthcare International, Inc. in Austin, Texas. "I wish it wouldn't use as much memory as it does, but I can work around that."

Despite these improvements, the servers' reliance on 3+Share has tempered the enthusiasm of some dealers despite the machines' ability to take advantage of 32-bit memory.

"We don't sell their hardware because you have to run their software on it," said Barry Spector, director of sales and marketing at Brown Associates, Inc., a Novell, Inc. shop in Belmont, Mass. "When 3Com's version of the OS/2 network software [3+Open] comes out [in mid-year], we'll have to re-evaluate." Such a version could expand the network servers' ability to run on non-3Com software based on OS/2. Spector's lack of confidence is not unique. A recent survey by Infonetics, Inc., a market research firm in Santa Clara, Calif., of 160 large and medium-size businesses, universities and federal and state governments, found that only 9% had opted for 3Com's operating system. Software from Novell and IBM gar-

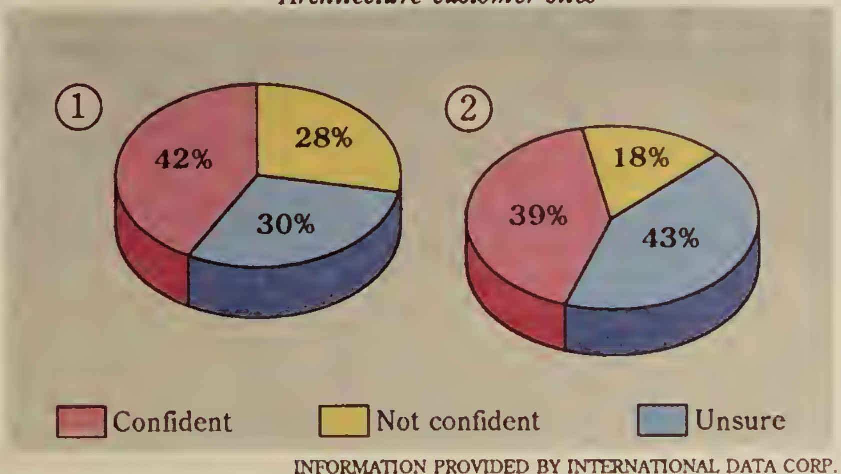
Continued on page 49

Inside

- 3Com, DEC present revised Ethernet proposal. Page 48.
- Fibercom adds FDDI-conformance products. Page 48.
- Racal-Milgo introduces encryptor option. Page 51.

Data View

Users rate IBM on multivendor networking:
(1) Will it alone meet their needs?
(2) Will it do so through industry standards?
Based on a survey of 107 IBM Systems Network Architecture customer sites



INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHART

Netlink SNA Hub ties in with Netmaster

BY ELISABETH HORWITT
CW STAFF

Netlink, Inc. and Cincom Systems, Inc. have jointly developed an SNA-to-SNA networking product, which they claimed provides far more flexible host-to-host file transfer than anything offered by IBM.

Netlink's new Interhost SNA Hub is said to work in concert with Cincom's Netmaster File Transfer Services to allow hosts on disparate IBM Systems Network Architecture networks to exchange files on a de facto basis over either leased or dial-up connections, according to Netlink Vice-President of Marketing David McCormick.

The product addresses the needs of companies with SNA networks, such as business partners engaging in electronic data interchange (EDI), that need to exchange files only intermittently, he added.

IBM's equivalent product, SNA Network Interconnect (SNI), provides both file-transfer

Continued on page 48

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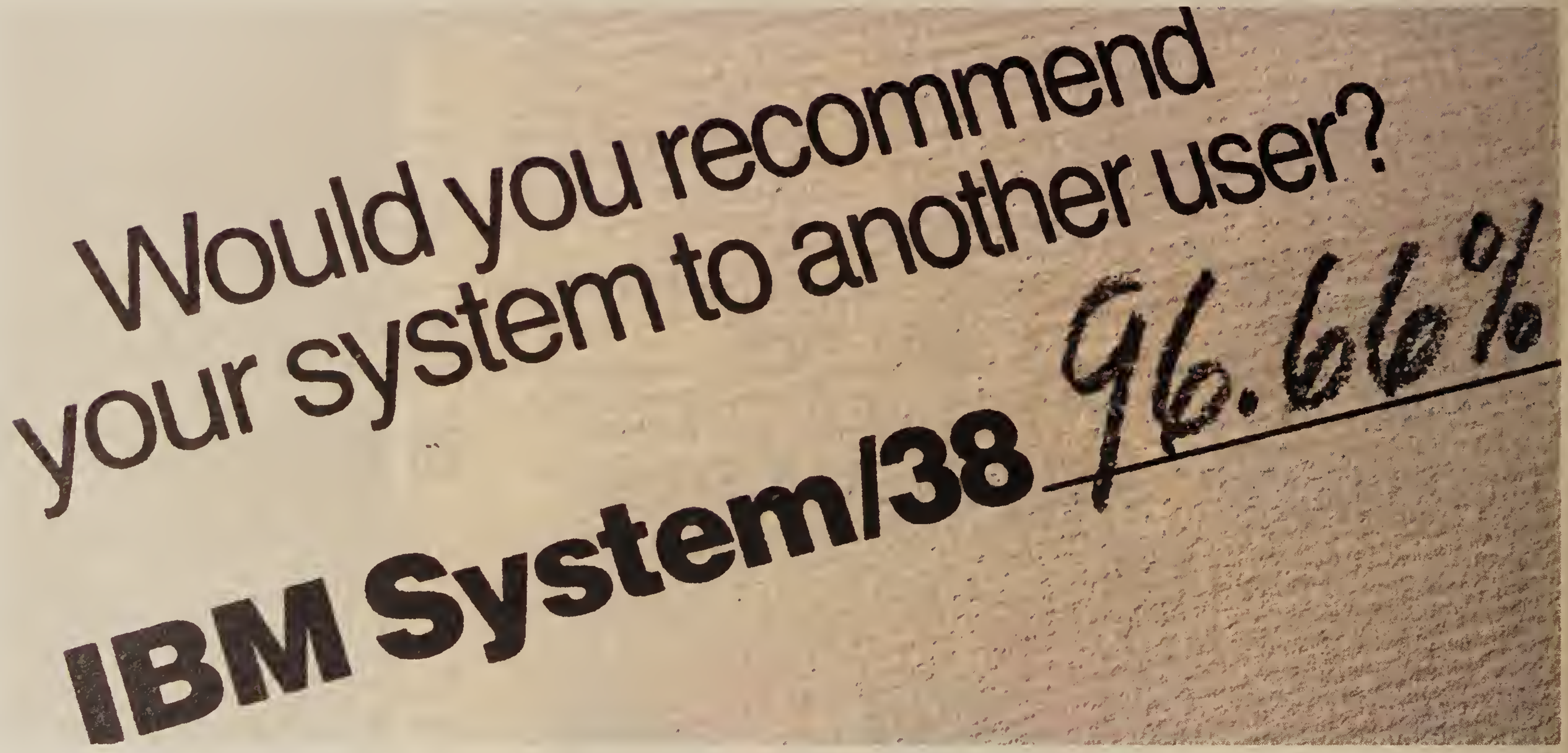
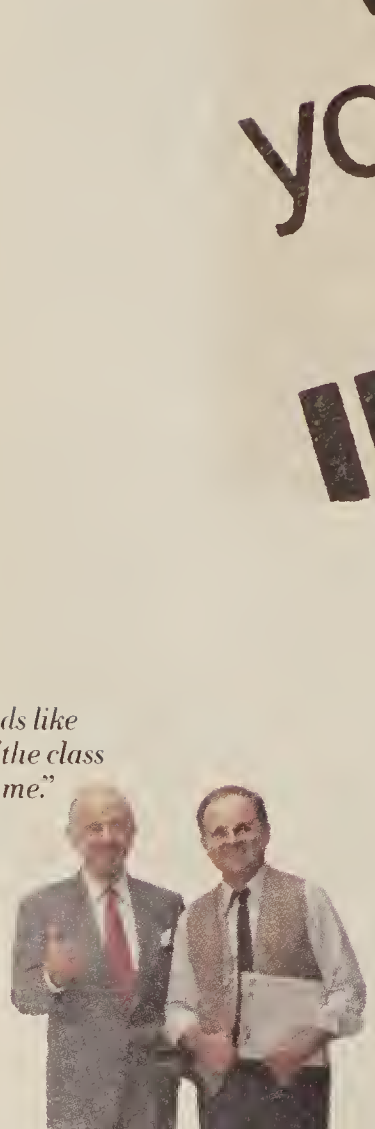


Would you recommend your system to another user?

IBM System/38 96.66%



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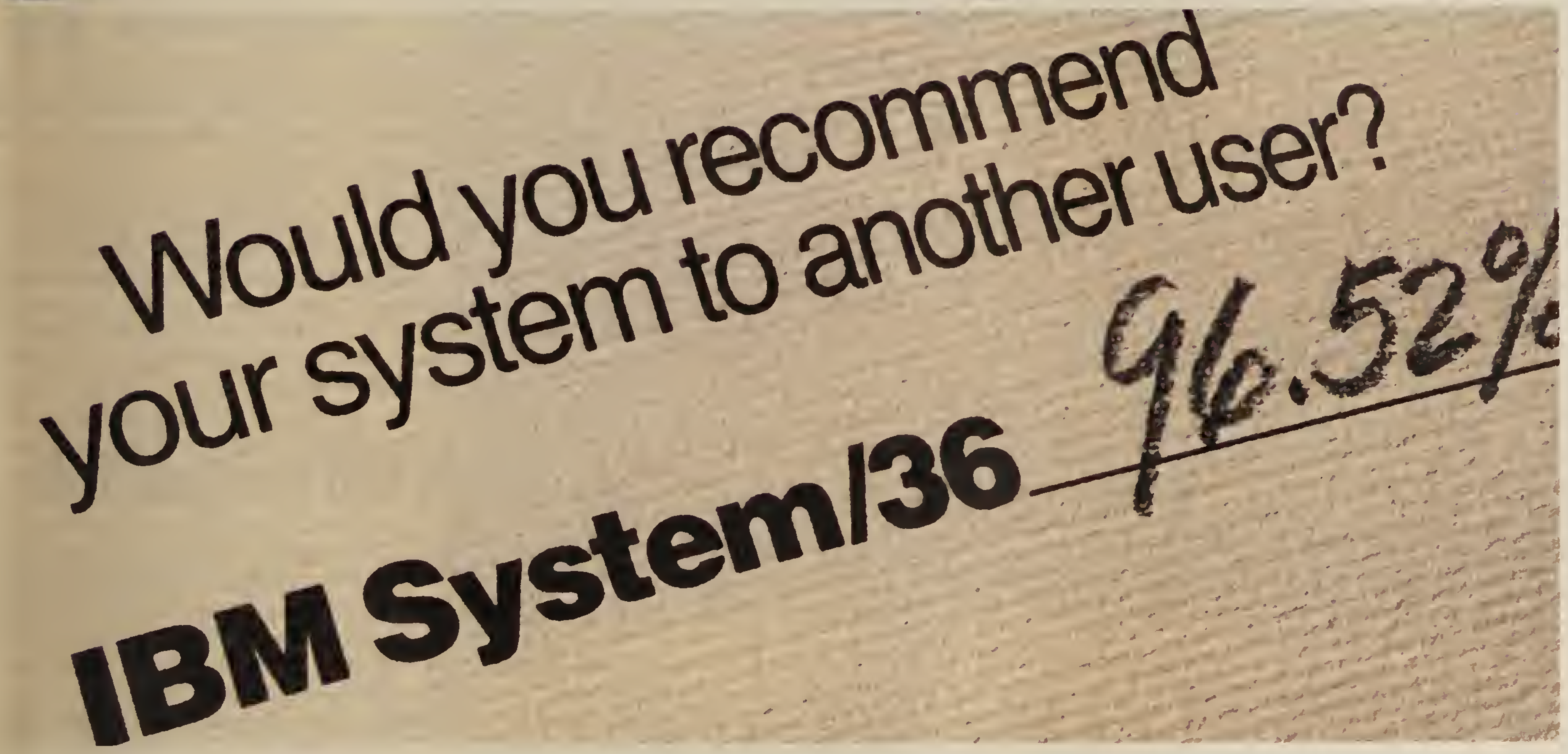

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IBM System/36 96.52%

but when it's from customers it means the most. If their opinion isn't the acid test, nobody's is.

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Fibercom sets sights on FDDI

Under pressure, firm pledges to add products meeting standard in '89

BY ELISABETH HORWITT
CW STAFF

ROANOKE, Va. — Fibercom, Inc. last week responded to pressure from both customers and competitors, announcing networking products that will conform to the Fiber Distributed Data Interface (FDDI) standard by the summer of 1989.

Users who install Fibercom's existing fiber-based Ethernet product line in the interim will be able to turn in their network boards and receive full credit toward the purchase of FDDI boards from the vendor.

Fibercom said it hopes the offer will keep customers from turning to rivals like Fibronics International, Inc. in Hyannis, Mass., which is already shipping FDDI-compatible networks.

Two Fibercom customers, the New York Stock Exchange and Tektronix, Inc., insisted on an FDDI migration path that did not saddle them with useless non-FDDI boards, according to Fibercom Chairman Albert Bender.

The fiber-based LAN market will increase from $171 million in 1987 to $813 million in 1992, according to Kessler Marketing Intelligence, Inc., which is a Newport, R.I.-based research firm.

FDDI defines two 100M bit/sec. channels on a fiber-based ring with devices accessing the channels through a token-ring protocol that is not compatible with the IEEE 802.5 standard, according to Bender.

The vendor's first FDDI-compliant products will be high-speed backbones interconnecting Ethernet and token-ring LANs based on other network media, Bender said. Prices will fall between $20,000 and $30,000.

Adding fiber power

Fibercom's second phase of product introductions reportedly will provide direct fiber-based connections for computers that require high-speed communications, such as engineering and computer-aided design workstations, Bender said.

The vendor's third round of FDDI introductions will provide direct channel-based host-to-host links, Bender said. "The major computer vendors will bring out their own FDDI interfaces," he added.

Digital Equipment Corp. is working on its own FDDI chip set, according to Bender. IBM reportedly has set up a prototype FDDI network and is likely to announce FDDI support with its 16M bit/sec. Token-Ring LAN introduction later this year, he added.

Third-party vendors such as Fibercom will provide interfaces for computers that still lack FDDI support as well as value-added functions including network management, according to Bender.

Netlink

FROM PAGE 45

and terminal-emulation connections between hosts on disparate SNA networks — while Interhost SNA Hub provides file transfer only, McCormick admitted. However, "Using SNI to marry two SNA networks is like getting married — you have to do a lot of planning and naming conventions, a tremendous amount of coordination," he claimed.

SNI also requires that MIS define address tables between the SNA networks in advance "and that your VTAM and NCP and mine be compatible and stay that way," said Cincom product manager Thomas Vollmar, referring to Network Control Programs.

Just good friends?

But SNA-to-SNA communication through Netlink's Hub "is like dating," without the need to set up cross-addressing between networks, McCormick said.

Netlink's Interhost product is a new version of SNA Hub, an existing communications processor that the Raleigh, N.C., vendor originally designed to provide flexible links between multiple hosts and IBM devices such as 3174 controllers. The Hub allows an IBM host to talk to up to seven other SNA hosts at speeds of up to 64K bit/sec., according to Netlink.

> "USING SNI to marry two SNA networks is like getting married. . . ."
>
> DAVID MCCORMICK
> NETLINK, INC.

Once hosts are connected via the Hub, file transfer is coordinated through Cincom's Netmaster File Transfer Services, an existing product that manages — and to a large extent automates — host-to-host bulk file transfer, Vollmar indicated.

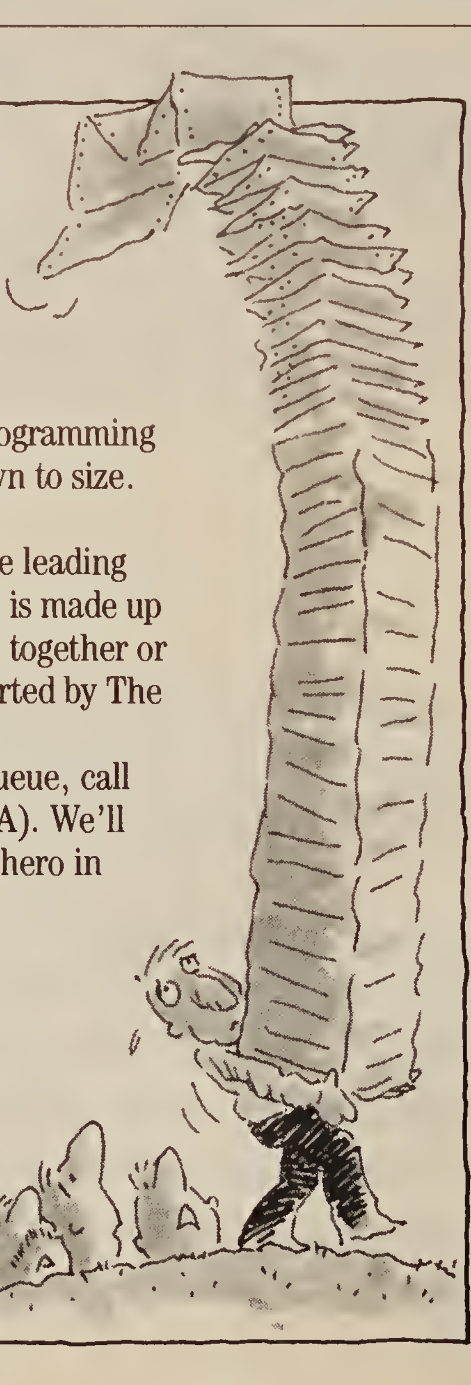
Bypassing operator

The software provides security, data compression and automation of many file-transfer functions, minimizing human operator involvement, Vollmar added.

For example, one system can be programmed to automatically send a file to another as soon as it has finished processing the data. This has the potential to be useful in EDI environments in which a corporation needs to send updated change orders, or perhaps shipping records, at regular intervals.

Netlink chose to support Cincom's bulk file-transfer program initially because the Cincinnati-based software vendor was willing to work with Netlink programmers to ensure compatibility between the two products, McCormick said. The Hub should also work "with a little tweaking" with IBM's Bulk Data Transfer package, System Center's Network Data Mover and other bulk file-transfer software utilizing IBM's LU0 protocol, he said.

The Interhost SNA Hub is priced starting at $17,000 for a V.35 interface. Cincom's Netmaster Network File Transfer Services is priced at between $3,000 and $35,000, depending on the type of host and options selected.



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DEC, 3Com tell twisted tale

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — 3Com Corp. and Digital Equipment Corp. recently presented a revised proposal for 10M bit/sec. Ethernet over unshielded twisted-pair cabling to a subcommittee of a standards group.

This latest proposal, according to 3Com, supports the tenets of a competing draft while offering a more flexible and less costly way for users to take advantage of already installed telephone cable, referred to as 10BaseT.

In a presentation last week to the 10BaseT Working Group, a subcommittee of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), 3Com and DEC also claimed their proposal offers the best means for supporting existing IEEE 802.3 coaxial standards, protecting installations using thin or traditional thick Ethernet cable.

Key to the 3Com and DEC scheme is the use of bidirectional signaling over a single pair of wires. Bidirectional signaling allows multidrop coaxial connections from a single connection to twisted-pair.

A competing standard proposed by Synoptics Communications, Inc. recommends unidirectional signaling, which requires two twisted-pair wires: one for transmitted signals and another for received signals.

By defining two attachment unit interface-compatible architectures, the 3Com-DEC proposal also meets one of the subcommittee's primary objectives.

One architecture requires a 10BaseT medium attachment unit at each end of the twisted-pair segment, providing a link between the workstation and the telephone wiring closet. This connects office workstations to the installed phone cable.

A second architecture allows coaxial multidrop or daisy chaining of additional stations from the workstation attached to twisted-pair, offering the mixed-media flexibility of coaxial and twisted-pair Ethernet in the same work group. Synoptics' proposal requires twisted-pair running to each workstation.

Another difference between the two approaches, according to Robert Metcalfe, 3Com's senior vice-president of technology, is that unlike 3Com, Synoptics requires users to purchase a special repeater.

Leong

CONTINUED FROM PAGE 45

vendor's disturbing that environment."

But wait a minute. A lot can be said for the smaller vendors when it comes to networking products that are designed to run in the IBM and DEC environments. Take Cincom, for example.

Devotees

Before IBM's Netview arrived on the scene, a number of users frustrated by the lack of network management tools IBM had to offer flocked to Cincom's Netmaster package. Today, devoted Netmaster users still say the Cincom tool is a much fuller network management product than Netview.

Another company, Interlink, specializes in linking Decnet to the IBM environment. Although DEC offers a similar gateway, users, including Du Pont, selected Interlink's gateway because of its higher speed — 800K bit/sec. vs. 56K bit/sec. from DEC.

> WHEN DEALING with the big guys . . . you might wind up getting impressed by trendy features you don't even need. Worse, you may change your game plan because you're too emotionally involved with the sales pitch.

Getting approval from top management for an unknown player isn't as difficult as you might think. You might be wondering how Batorski got the NBI contract cleared at Orion. The approach was simple: Instead of saturating the entire company with NBI products in one fell swoop, a $1.2 million pilot was installed. It included 18 micros, one NBI controller and three printers. The installation was followed up with user surveys.

When Orion officials were presented with the positive results, they gave the green light to have NBI network the entire building.

Today, for the first time, more than 250 Orion employees are taking advantage of electronic mail, data base access from a PC and other types of remote communication. Orion is now installing its fourth network from NBI.

Looking back, Batorski says going with the other major systems vendors under consideration would not have satisfied the requirements at hand.

Write this down

So here's another lesson to learn. When dealing with the big guys, don't get sidetracked. You might wind up getting impressed by trendy features that you don't even need. And worse, you may suddenly decide to change your initial game plan because you're now too emotionally involved with the sales pitch.

One user at a television company in New York recently complained that the large vendors spend too much time on their newest capabilities rather than satisfying basic user needs. "I wish I could just buy a stripped-down model, but that just doesn't seem to be available anymore," he lamented.

Also, consider this: If your firm is larger than the vendor, chances are that supplier will bend over backwards to give you the support you want.

In Orion's case, it was able to secure data on NBI's financial status (just in case) and to get a close-up view of NBI's product plans over the next year.

So the next time a salesman from Brand X comes knocking, don't slam the door in his face just because he doesn't have a designer logo tatooed on his forehead. He might just have the solution to the network problem you have been agonizing over for months. Lighten up, folks, and take a chance.

Leong is *Computerworld*'s West Coast Bureau Chief.

3Com

CONTINUED FROM PAGE 45

nered 38% and 27% of the votes, respectively.

But 3Com product manager Jim Cansler dismissed the survey as merely representing network configurations, not product satisfaction. "We're primarily designed for systems where you have one larger network that is in a mixed environment in terms of applications," he said.

Loyal 3Com users said the preference for Novell's operating system is akin to judging a book by its cover. "Novell puts a more graphic front end on their system that makes it look a lot better," General Telephone's Heindel said. "But the capability of Novell is reduced when you get into larger network environments. Talk to people who can get into the nuts and bolts of operating systems to appreciate the power and versatility 3Com offers."

Despite the 3Server/400 series' warts — beta-test users admitted superficial software bugs and a clock that lost 50 seconds upon rebooting — early users generally seem satisfied.

"There are six or seven good reasons for getting the server," said Doug Gold, an analyst at International Data Corp. in Framingham, Mass., citing the servers' multitasking, multiuser functionality, increased complexity of application sets and greater security and network management capabilities as well as OS/2 and IBM Personal System/2 capability.

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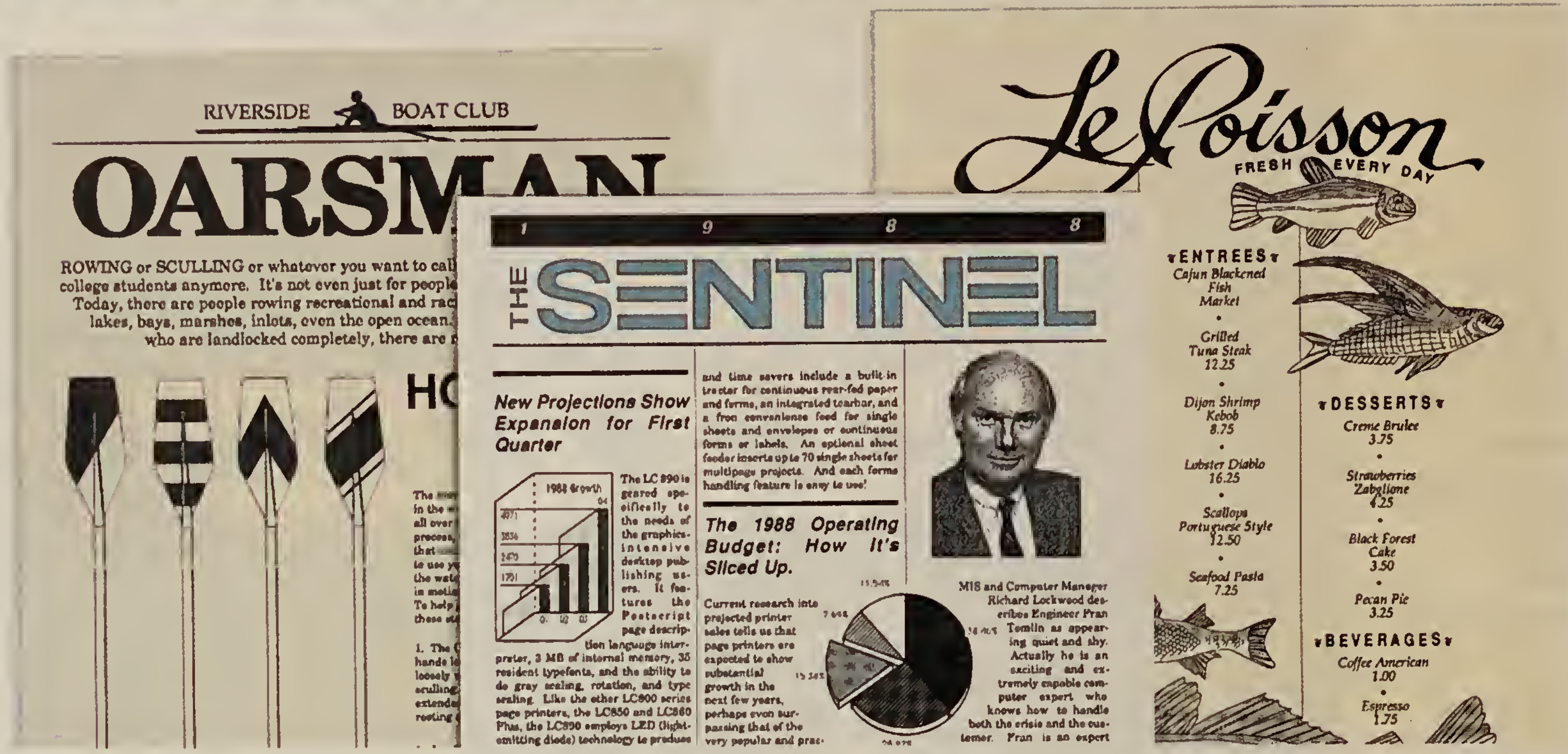
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THE SENTINEL

New Projections Show Expansion for First Quarter

The LC 890 is geared specifically to the needs of the graphics-intensive desktop publishing users. It features the Postscript page description language interpreter, 3 MB of internal memory, 35 resident typefonts, and the ability to do gray scaling, rotation, and type scaling. Like the other LC800 series page printers, the LC850 and LC860 Plus, the LC890 employs LED (light-emitting diode) technology to produce

and time savers include a built-in tractor for continuous rear-fed paper and forms, an integrated tearbar, and a front convenience feed for single sheets and envelopes or continuous forms or labels. An optional sheet feeder inserts up to 70 single sheets for multipage projects. And each forms handling feature is easy to use!

The 1988 Operating Budget: How It's Sliced Up.

Current research into projected printer sales tells us that page printers are expected to show substantial growth in the next few years, perhaps even surpassing that of the very popular and prac-

MIS and Computer Manager Richard Lockwood describes Engineer Fran Tomlin as appearing quiet and shy. Actually he is an exciting and extremely capable computer expert who knows how to handle both the crisis and the customer. Fran is an expert

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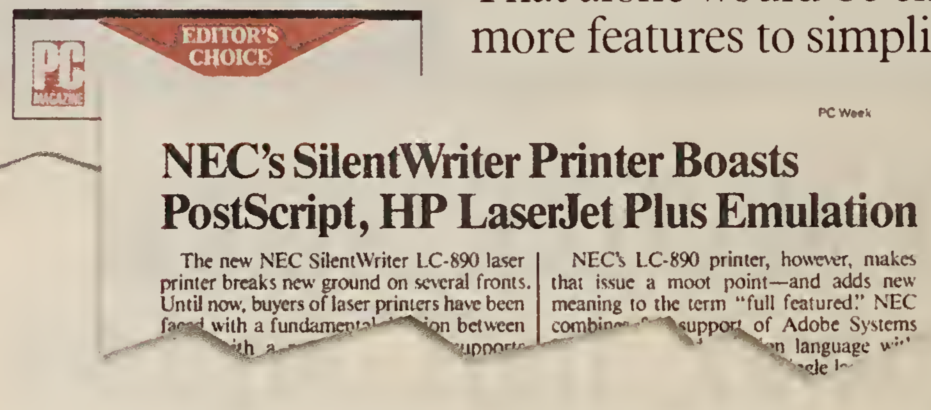
Our Silentwriter™ LC890 is the first desktop publishing printer that gives you both popular standards for creating graphics and type: true Adobe PostScript® and LaserJet Plus emulation. That alone would be enough to cause headlines. But we also added many more features to simplify desktop publishing. Like both Apple and IBM compatibility. *PC Week* stated, "the LC890 is actually better than having both an Apple LaserWriter Plus and an HP LaserJet Plus on your desk." Equally impressed, *PC Magazine* awarded it an "Editor's Choice." And cited it in their "Best of 1987" issue.


PC MAGAZINE
EDITOR'S CHOICE

PC Week

NEC's SilentWriter Printer Boasts PostScript, HP LaserJet Plus Emulation

The new NEC SilentWriter LC-890 laser printer breaks new ground on several fronts. Until now, buyers of laser printers have been faced with a fundamental

NEC's LC-890 printer, however, makes that issue a moot point—and adds new meaning to the term "full featured." NEC combin support of Adobe Systems

And because the Silentwriter has a simple, trouble-free printing mechanism, it will be creating headlines for years to come. In fact, it's twice as reliable as ordinary lasers, with an average life of 600,000 pages.

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NEC Information Systems, Inc.

C&C Computers and Communications

NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

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NEW PRODUCTS

Modems/Multiplexers

Young Design, Inc. has announced the **DR-10**, a combination RS-232C asynchronous data restorer and four-port splitter said to remove jitter from asynchronous RS-232C data.

Data from the master port is reconditioned with all jitter removed and then distributed to four auxiliary ports with a 1-byte time delay, the vendor said.

The single-channel version costs $1,195, the dual-channel version $1,695.

Young Design, 7882 Tyson Oaks Circle, Vienna, Va. 22180. 703-448-8939.

Racal-Milgo has introduced an **Integral Encryptor Option** for its Omnimode family of system modems and its RM-series modems.

The option offers synchronous or asynchronous communications capability at speeds up to 16.8K bit/sec. It operates in point-to-point, multidrop and dial-backup applications.

The Integral Encryptor option is available in stand-alone or rack-mount versions. Pricing begins at $850 for the factory-installed option and $1,000 for the field upgrade kit.

Racal-Milgo, 1601 N. Harrison Pkwy., Sunrise, Fla. 33323. 305-475-1601.

NEW AT COMNET '88

Many products are set to be rolled out at this week's Communications Networks Conference '88, or Comnet:

An automated test system to measure end-to-end performance of private networks is being announced by **Teradyne, Inc.'s** Telecommunications Division.

Testnet 1000 automatically performs daily network surveillance that measures service quality. Every route between all end points is tested for connection and transmission quality of both voice and voice-band data. Analyzed results are available in report form from the optional Testnet 1000 Controller.

The Measurement Units range in price from $3,500 to $10,000. Teradyne, 1405 Lake Cook Road, Deerfield, Ill. 60015. 312-940-9000.

Chipcom Corp. will introduce the **Ethermodem III/18** family of modular 18-MHz IEEE 802.3 10BROAD36-compliant broadband Ethernet transceivers for single-cable local-area networks.

The products are compatible with existing Ethermodem products. Their chassis/module design allows users to alter frequencies and change bandwidth from 18 to 12 MHz by replacing individual modules rather than purchasing entire units. Users can also upgrade from one port to two ports to eight ports by changing the chassis.

The products operate at 10M bit/sec. A one-port model costs $3,650, a two-port model $3,950 and an eight-port model $5,150. Chipcom, 195 Bear Hill Road, Waltham, Mass. 02154. 617-890-6844.

The **Model 9232 Controller/Terminal Multiplexer**, designed for IBM 3174 and 3274 cluster controller applications, will be announced by **Canoga-Perkins Corp.**

The terminal-end version enables the connections of 32 category A terminals to any IBM 3174 or 3274 controller via a single multiplexed line, coaxial or fiber. The controller-end version multiplexes up to 32 controller ports conforming to the IBM 3299 protocol.

The multiplexer is available with eight, 16, 24 or 32 ports. Prices range from $795 to $3,095. Canoga-Perkins, 21012 Lassen St., Chatsworth, Calif. 91311. 818-718-6300.

A dial-up access security modem said to offer full-duplex operation at 9.6K bit/sec. or 4.8K bit/sec. over two-wire dial-up or two- or four-wire leased lines will be announced by **Cermetek Microelectronics, Inc.**

The **9600S** modem meets CCITT V.32 specifications. It operates synchronously and asynchronously. Password and callback functions prevent unauthorized access. Trellis coding supports forward error correcting and echo cancellation.

The 9600S costs $1,995. Cermetek, 1308 Borregas Ave., Sunnyvale, Calif. 94088. 408-752-5000.

A software-controlled T1 multiplexer called **D/I Mux-II** is slated to be introduced by **Coastcom.**

The multiplexer combines voice, synchronous and asynchronous data and audio/video program information over a standard T1 line. Features include remote diagnostics and control and integrated network management.

The D/I Mux-II costs from $3,000 to $27,000. Coastcom, 2312 Stanwell Drive, Concord, Calif. 94520. 415-825-7500.

Fastcomm Communications Corp. is adding the **FDX 2448** to its Fastcomm FDX series of modems.

The FDX 2448 is a CCITT V.22 bisynchronous modem that operates at a primary data rate of 2,400 bit/sec. over the Public Switched Network or over leased lines. Features include Microcom Networking Protocol Class 5 adaptive data compression and fallback modes compliant with the Bell 212A and Bell 103 standards.

The FDX 2448 costs $599. Fastcomm, 12347 E. Sunrise Valley Drive, Reston, Va. 22091. 703-620-3900.

Why more companies choose high-speed channel interfaces from KMW Systems' Auscom line.

The Auscom line of channel interfaces from KMW Systems has been outselling the competition for more than 12 years. In fact, we now have an installed base of more than 4,000 units. And for good reason: KMW Systems offers the broadest range of IBM and compatible mainframe channel connections available anywhere, backed by a dedication to service and support that's unsurpassed.

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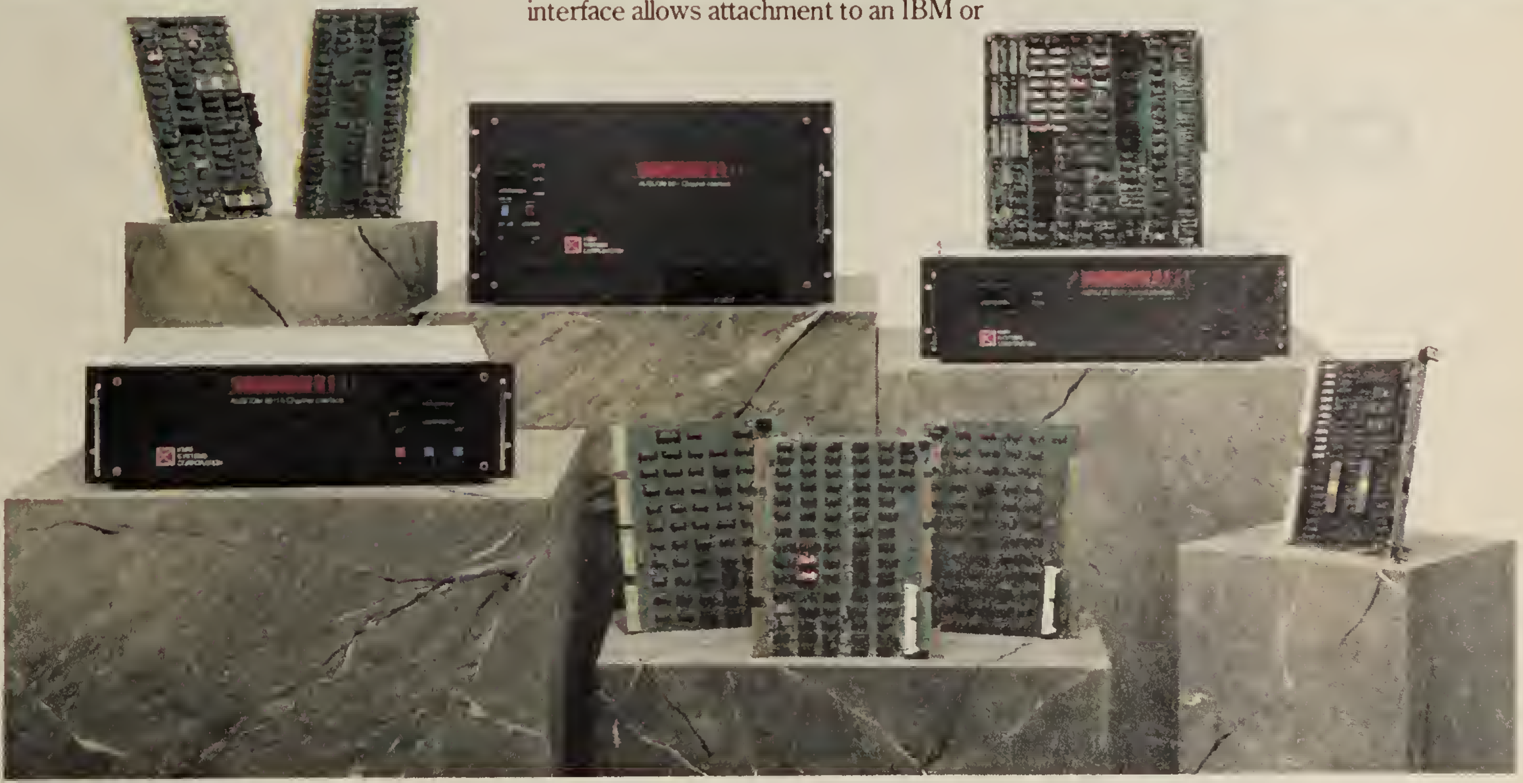

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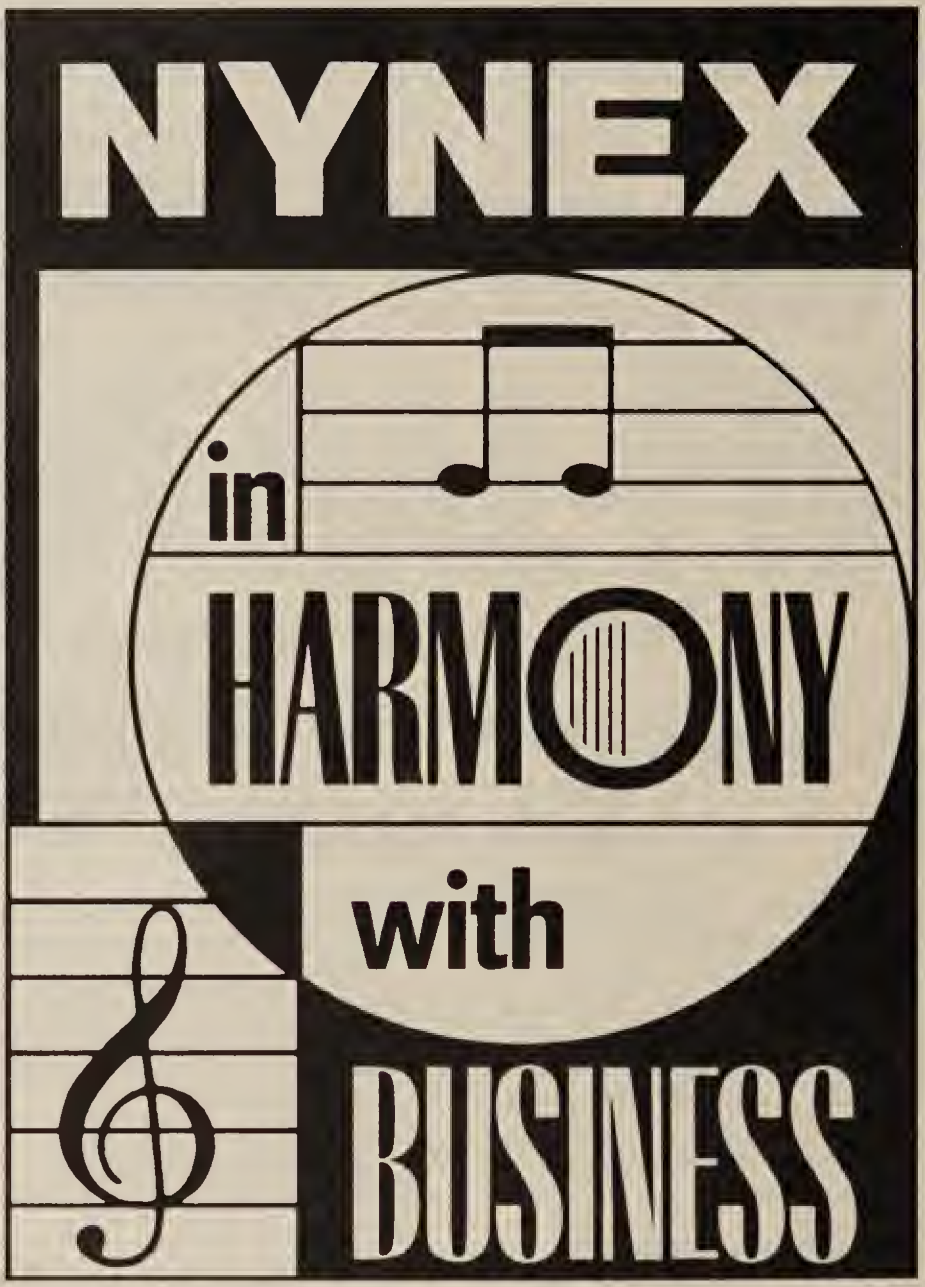

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INSIDE

The Politics of Mega-Networking

Implementing a very large-scale LAN takes time, planning — and diplomacy. Page S2.

Territorial Imperative

MIS must expand its role in LAN governance in order to advance corporate connectivity. Page S5.

Low-Impact Wiring

Unshielded twisted-pair offers users an inexpensive and obvious cabling solution: an extension of telephone wiring. Page S6.

Still Kicking

Arcnet, thought by many to be a relic, is still an active alternative for low-cost, efficient LAN operation. Page S7.

Built for Speed

When finished, the Fiber Distributed Data Interface will provide a standard for high-speed fiber-optic data communications. Page S8.

Product Chart

A detailed guide to LAN boards. Page S12.

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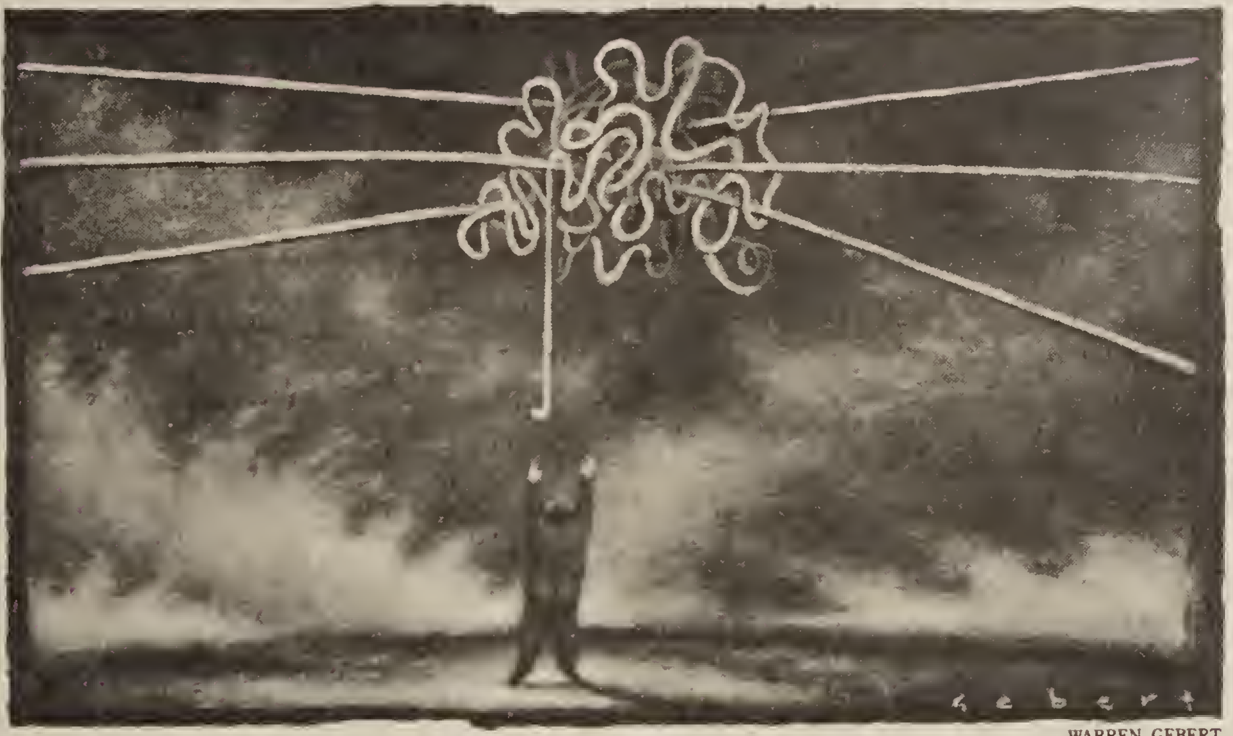
Constructing a workable LAN is more complex than advertised, especially when the assembly instructions are deficient

REALITY FALLS SHORT OF HOPES

BY AARON BRENNER



WARREN GEBERT

It's the typical love 'em and leave 'em story. Seduced by promises of integration and interoperability from network vendors and system integrators, network managers are left to bring up a complete, corporatewide network without support.

While the advent of local-area network hardware standards has accelerated the acceptance of LAN technology, it has also unleashed a host of problems that arise from two sources: exaggerated vendor claims and inflated user expectations.

Continental Grain Co., an international commodity trading and processing company headquartered in New York, operates 24 hours a day. The company has offices in the U.S., Europe, Latin America, Africa and Asia. Larry Stouder, manager of the information center at the company, began to install a network of LANs a few years ago. He says one day the network will connect most of the company's international offices as well as the myriad computer resources within them. In the process of implementing this networking plan, Stouder says he has become more knowledgeable than most professional LAN installers — but this knowledge was hard won.

"When we started, I brought in professed specialists on network wiring," Stouder says. "We hovered over them because we wanted to know more. What we found out, however, was that they didn't know what they were doing. We knew more than they did."

Shaken by the discovery, Stouder dismissed the specialists and began educating himself. "We had to learn enough about wiring so that we could do it ourselves," he says. Stouder does not maintain that his bad experience with a single installation firm is typical of the whole LAN industry. But, he says, it was sufficient to make him wary of depending on outside experts.

Continental Grain's network, which is based on Banyan Systems, Inc.'s server hardware and Virtual Networking Software, or Vines, software and which now spans three continents, is entirely the work of internally developed experts. "By developing expertise, we have created our own specialists," Stouder says. "Most people can't do that because it takes a sizable investment. Most have to seek out some kind of professional help."

Good Samaritan Hospital in San Jose, Calif., managed to find the professional help required to troubleshoot its 3Com Corp. LAN, but it required searching beyond the vendor. When the hospital's system went down the day after Thanksgiving last year, the dealer that sold it was stymied, according to physician services representative Marianne Lucas. "They looked at it for a week and a half and got nowhere," she says. The hospital then decided it was time to look for someone with more experience.

That someone turned out to be a consultant from the Lanquest Group, a consulting firm in Santa Clara, Calif. It took three hours for the specialist to diagnose the problem, according to Lucas, and within six hours, he had the network back in operation. "The lesson," Lucas says, "is to be sure your vendor is experienced in the hardware and software he is selling."

The truth is that demand for easy integration

Brenner, editor-in-chief of *LAN Magazine*, is based in New York.

Reality

FROM PREVIOUS PAGE

of a company's computer and communications resources may far exceed the possibilities, especially given the existing equipment and applications. That is why an honest vendor tells the client, "Your solution depends on what you have and what you want to do."

"The way networks are sold is like selling alcohol to teenagers," says Mark Freund, president of Interconnect Network Consulting Group, Inc. in Pasadena, Calif. "The vendors make [the technology] look so simple, but it isn't."

Stouder

MIS managers might be immune to the intoxicating properties of a smooth sell. But they often have little or no input in the LAN purchase decision. Instead, these critical choices are made by personal computer users, newer to the game and used to a generic product that performs a multitude of tasks easily and quickly.

If it is true, as Freund contends, that vendors are in the wrong for selling LANs as if they were as simple and uncomplicated as PCs and should be accorded as much attention and support as mainframes, it is also true that corporations are guilty of similar transgressions. Most firms, however, have not made the strategic commitment and corresponding investment required to produce sound LAN development.

The corporate world, Freund says, has either chosen to avoid the issue entirely or to confine its experimenting to the departmental level. The result in either case is helter-skelter LAN implementation. MIS departments get squeezed because they are not driving LAN purchase and implementation but are only trying to splice together the mismatched pieces sold to end users and executives.

Some guidelines

Effective implementation cannot be accomplished that way. It takes careful planning and execution. There are five critical elements to a successful network installation, according to Jim Rosen, president of LAN Systems, Inc., a network systems integrator in New York.

One is to stay with standards, he says, noting, "We view Ethernet and token-ring as the viable long-term standards at the link level." The second is to make a complete needs assessment that includes predictions for company growth. The third is to test every piece of equipment as it works in your environment or to use a vendor who will do it for you. The fourth is a complete, coherent system design. And the fifth, which, Rosen says, is probably the most important, is to arrange a support and service program, even if it is done in-house. "Good service," he says, "can make even mediocre hardware perform well."

While this framework fits almost every network installation, it does not provide selection criteria for network hardware and software. That, experts agree, is a highly individualized problem for which only generalized directions can be offered in the abstract.

To understand what is needed beyond the general level, Frank Dzubeck, president of Washington, D.C.-based Communications Network Architects, Inc., suggests establishing a "community of interest matrices that are analogous to who is talking to whom." This is done in the design phase. "It boils down to departments or logical groups of PCs," he says. "That's when topology begins to emerge. You can see if there are distance limitations, and you can begin to assign the components of the network: file servers first, then bridges and gateways.

Needs assessment and planning is a critical stage that often takes much longer than the complete installation. Many users regret they did not take more time to assess their needs as well as those of the network.

"We discovered lots of hidden costs in maintenance, operations, dedicating people to network maintenance and ongoing software maintenance, which we didn't expect. And putting it together took more time than we thought," says Wayne Gacnik, manager of systems engineering at Sherwin Williams Co. in Cleveland.

Ray Thomas, manager of office automation at Hadson Gas Systems, Inc. in Irving, Texas, agrees. His office has IBM Personal Computers and Hewlett-Packard Co. HP 3000 minicomputers connected by HP's Starlan network. He also has X.25 links to other offices in Oklahoma City and Houston via Telenet. "The most astounding thing that I found was the complexity of all the network pieces of software," he says. "All the configurations have to match. It is amazing. You have to manage every PC just like you do the mainframe."

> "THE WAY networks are sold is like selling alcohol to teenagers. Vendors make [the technology] look so simple, but it isn't."
>
> MARK FREUND
> INTERCONNECT NETWORK CONSULTING GROUP, INC.

At Hadson Gas, Thomas runs a Starlan network over twisted-pair telephone wire. Starlan is one of the emerging hardware standards to gain widespread vendor acceptance. It is endorsed by AT&T, 10 Net Communications, Western Digital Corp., HP and others. It runs at 1M bit/sec., considered slow in the LAN world, but fast enough as far as Thomas is concerned: "It works for our on-line applications with the HP 3000s and everything we do."

Starlan is a simple network, having taken much from telephone technology. It uses RJ-11 jacks for all its connections, just like most phone systems. It is possible, using four-pair wire, to run the phone system and Starlan over the same cable.

Unfortunately, even Starlan is not as simple as its vendors would like to think. Thomas had no problems with it, but Rick Curl, vice-president of research and development at Postron Corp. in Birmingham, Ala., did when he tried to install the network along with his electronic key telephone system. "We went through lots

Continued on next page

LANs: See how they grow

BY LARRY DEBOEVER

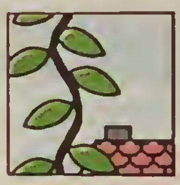
Within three years, local-area networks will grow to a new order of magnitude in Fortune 2,000 companies. In these organizations, LANs will constitute the predominant connectivity architecture, interconnecting hundreds, or thousands, of personal computer and terminal users as well as departmental computers, mainframes and other shared resources.

Little is known today about very large-scale LANs (VLS/LANs), primarily because only a handful currently exist. One thing is clear, however: VLS/LANs are very different from PC work group or departmental LANs.

To say simply that they are more complex is a colossal understatement. Such configurations support 500 nodes at minimum, with the average in the 2,000- to 5,000-node range.

Implementing a VLS/LAN means that no single person in the corporation will fully understand the physical network. This is not necessarily cause for alarm; 2,000-line telephone systems work just fine, and no one knows everything about those systems, either.

There appear to be three distinct models for the creation of a VLS/LAN — the hyperthyroid model, the connect-the-dots model and the big bang model.



The hyperthyroid model. In this model, a company installs a moderate-size LAN after a prototype effort. This LAN is visible in the company and is a success. At some point, a decision is made to extend it to cover an additional set of users, then another set and so on.

Although most hyperthyroid LANS work well, their success contains a weakness: The purpose of the initial LAN installation is not to create a single, large corporate LAN. It just happens — frequently without design or management. Corporate MIS does, however, usually step in to provide early leadership, treating the LAN as just another part of the terminal network.

The connect-the-dots model. This model is another evolutionary pattern for VLS/LANs. In this model, different divisions, departments within divisions and work groups within departments make relatively independent LAN decisions. One or two of these LANs may have 100 or more users, but most are PC cluster LANs with 10 to 30 users.

Eventually, someone in corporate management decides to interconnect all of these LANs, either by adding a backbone LAN to service most of the new users or extending one of the installed LANs to serve as the backbone.

This strategy usually requires a heavy reliance on gateways to interconnect dissimilar LANs. It may also involve eliminating some of the PC cluster LANs because they cannot be effectively interconnected with the backbone.

Corporate MIS usually takes the lead technical role in selecting the backbone LAN and, in the process, regains control of territorial resources.

The big bang model. This model occurs when there is an enterprisewide decision that embraces LAN technology as the standard for user connectivity, embraces a single LAN vendor and separates the selection of the vendor from installed LAN technology.

This strategy is characteristic of companies that have been slow to adopt LAN technology and have made a corporate decision to adopt LANs as a standard. Clearly, this is the type of sale IBM has targeted for its Token-Ring network.

Problems of VLS/LANs

No matter which model of development a corporation uses, all VLS/LANs share a common set of problems. Network management and support are issues in any LAN, but in LANs of this scale, the difficulties loom much larger, and resolution requires substantial resources.

Successful VLS/LANs use centralized help desks to provide assistance in LAN use, troubleshooting and PC software support.

The performance of VLS/LANs is also an extremely important issue. Two critical factors are the performance of bridges and the design of the network.

In general, bridges have difficulty meeting the throughput demands made on them by large networks. Many older bridges simply cannot support the number of addresses required.

Every LAN is dependent on good design for good performance. In VLS/LANs, however, the issue is critical. Its seriousness is compounded by the fact that the structure tends to evolve rapidly. In the words of one user, "Every day, a [VLS/LAN] segment is being added, modified or screwed up somehow."

Another common problem is data ownership, particularly on departmental machines. When all of the nodes are interconnected, MIS often claims ownership to the departmental data, since the network has made it a corporate resource. Departmental users, on the other hand, still view such data as their property.

This problem is particularly prevalent in VLS/LANs of the connect-the-dots type. In these instances, departmental users typically own their own minicomputers and LANs before interconnection. Consequently, they end up feeling they've lost something in the transition. Occasionally, the frustration threatens to erupt into open conflict. One departmental MIS manager in a major Fortune 1,000 company, for example, recently threatened to cut the newly installed backbone LAN connected to his DEC VAX network because, he says, "Corporate MIS thinks they own the data."

VLS/LANs are an entirely new phenomenon, and we still know very little about them. Understanding will have to come quickly, however, because most medium-scale and large companies count ownership of one among their strategic objectives. If we don't find out how to pursue implementation by design, implementation by evolution will prevail. ●

DeBoever is president of DeBoever & Associates, an Acton, Mass., research and consulting firm that has been studying VLS/LAN implementation.

Reality

FROM PREVIOUS PAGE

of grief putting in Starlan," he says. "It ran fine by itself, but it would not run with the phone system."

After weeks of sending products back and forth, Western Digital (a maker of Starlan), AT&T (the designer) and Curl finally figured out that the phone system and Starlan were attempting to use the same conductors in the four-pair cable.

Starlan is similar to Ethernet, an architecture that, according to Doug Gold, LAN analyst at International Data Corp. (IDC) in Framingham, Mass., accounts for 75% of the installed base of LANs.

Ethernet, unlike Starlan, has a raw data speed of 10M bit/sec., making it the fastest commercially available network running on copper cable. Both, however, use a contention access method, called carrier-sense multiple access with collision detection (CSMA/CD), to regulate use of the network and keep users from bumping into each other. And both are also part of the IEEE 802.3 standard.

Ethernet also exists in another standard form. Ethernet networks were developed long before the 802.3 standard was adopted, and, at one point, Xerox Corp., Digital Equipment Corp. and Intel Corp. joined forces to create a standard for Ethernet, which was widely adopted and still persists despite the renunciation of its creators.

Not the same

There are slight differences between the IEEE's standard and the previous one. These revolve around the use of the IEEE 802.2 protocol. The older Ethernet networks do not use this link-level protocol, while the IEEE Ethernet networks do.

While these differences may make the two standards incompatible, vendors insist and consultants tend to agree that the incompatibility is nothing users need to worry about, since most products support both.

The 802.3 standard, which includes Ethernet on thick coaxial cable at 10M bit/sec., Ethernet on thin coaxial at 10M bit/sec. and Starlan on twisted-pair at 1M bit/sec., is now clearly the predominant Ethernet standard. It is likely, however, that the IEEE 802.3 Ethernet standard will not be the predominant network hardware of the future, even though it has such a large installed base today. More likely, the 802.5 token-ring standard will dominate.

The challenge: Token-ring

IDC's Gold calculates that by 1990, 50% of the installed base of LANs will run on token-ring hardware. By 1993, he says, that figure will be closer to 80%.

The main reason for the predicted success of the token-ring standard is IBM's endorsement of the technology. IBM has stated that it will put its entire product line on token-ring. Indeed, since 1984, the company has introduced token-ring interfaces for almost all of its lines of computers.

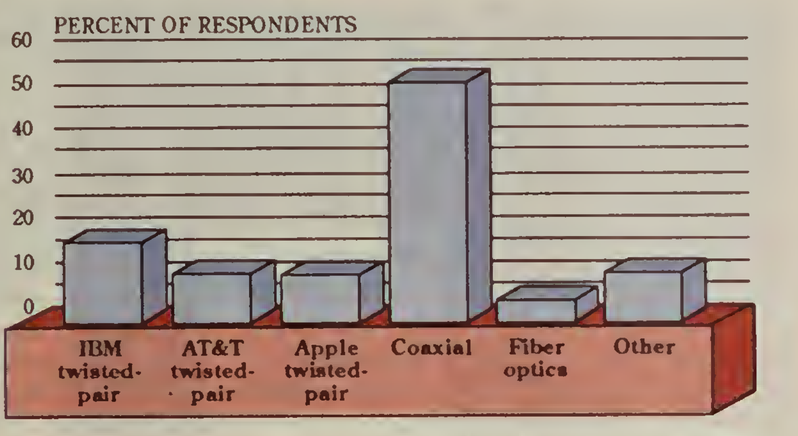
"With the institutional type of network, where an IBM mainframe is involved, the hardware choices are narrow," Communications Network Architects' Dzubeck says. "You definitely want token-ring."

Token-ring offers other advantages, including capacity, flexibility, ease of growth and performance. The token-passing access method guarantees each node a response time that is governed in a predictable manner by the size of the network, which means it is possible to build token-ring networks of hundreds of nodes.

Ethernet, on the other hand, is strapped with the CSMA/CD access method. Every time two nodes try to use the network at the same time, their transmissions collide, forcing them to back off, wait and then try again.

Local-area network cabling preferences

Twisted-pair ranks second in popularity, with a combined 39% compared with coaxial's 53%



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CW CHART

Adding more nodes increases the number of collisions, forcing each node to wait longer for network access.

Token-ring handles every type of traffic consistently and predictably, whereas Ethernet is rather sensitive to the type of network traffic it carries.

Bursty traffic, even when generated by a large number of nodes, does well on Ethernet, since the likelihood of collisions is low. Heavy traffic on a small number of nodes may result in performance degradation, since the risk of collision is also higher.

Ethernet makes up for some of its problems with its 10M bit/sec. raw data speed. Indeed, few networks are large enough or have enough traffic to reach the limitations of such bandwidth.

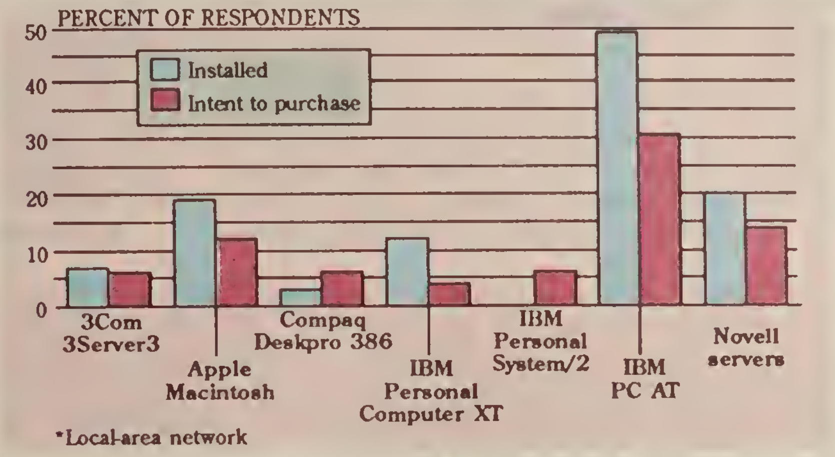
In addition, it is possible, using bridging products, to split up networks to decrease traffic and increase performance. Nevertheless, the real data throughput of Ethernet rarely approaches 10M bit/sec.

Token-ring's raw data speed is only 4M bit/sec.; it has lower overhead, however. In certain situations, its actual throughput may equal that of Ethernet.

The most important factors to consider when deciding between these two standards are type of traffic, number of nodes, cost (Ethernet is slightly less expensive right now) and application.

Destined to serve

Purchase intent contrasts strongly with current installation in LAN server category; both IBM and Apple are expected to lose share*



*Local-area network

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Wiring

Until 1987, token-ring enjoyed another advantage over Ethernet: Instead of coaxial cable, it uses shielded twisted-pair wiring, which is a less expensive media that is easier to install and maintain.

"The real edge of shielded twisted-pair is that it has the characteristics for the future: the right number of conductors, the right impedance," Freund says. "Being shielded, it eliminates cross talk."

Token-ring also has a star-wired ring layout that makes troubleshooting and node isolation easier, since all nodes are wired directly back to a multistation access unit (MAU).

In networks of more than 50 nodes, the centralized cable control provided by such a layout is a necessity. It can work in much the same way as Starlan, only alongside the phone system rather than with it.

But as Mark Robinson, director of operations for Curtis Manufacturing, Inc. in Peterborough, N.H., points out, this system is not foolproof. "There are distance limitations for the cable run between MAU and the station and for the complete network. We had problems with this. If a computer is off, its cable is still part of the overall length of the network. This led us to exceed the distances, causing the token not to be regenerated," he says.

With Ethernet, because all nodes share the same trunk, fault and node isolation are more difficult. And, what is worse, a faulty node can impinge on other nodes.

With token-ring, the search for a faulty node or cable simply means moving to a MAU and unplugging nodes one by one. With Ethernet, LAN managers must move from node to node, testing the cable as they go. This can double or triple network downtime. Poor diagnostics, more than any other reason, is why users and system integrators moved away from Ethernet.

A new life

A series of product developments seem to have given Ethernet new life, however. These focus on putting Ethernet on unshielded twisted-pair, as Starlan is.

The only difference is that in these configurations, Ethernet still runs at 10M bit/sec. The main vendors offering this approach are DEC, HP, 3Com and Synoptics Communications, Inc. in Mountain View, Calif.

The Synoptics product, called Lattisnet, is especially innovative. It puts Ethernet on essentially the same physical layout as Starlan but adds diagnostic power and flexibility.

Lattisnet, like Ethernet, leans heavily on cabling principles developed in the telephone industry. Increasingly, the data communications industry is adopting these principles.

IBM and AT&T sponsor cabling plans revolving around centralized wiring closets, a star-of-stars layout, twisted-pair copper cable connected to the desk top and fiber-optic cable between wiring closets. Now, all the major LAN hardware standards can take advantage of these cable plans.

As Hadson Gas's Thomas points out, "Having a centralized wiring scheme along the lines of the telephone system makes troubleshooting and adds, moves and changes much easier. Every node can easily be isolated.

"Besides," he adds, "the technology is more developed, and you only have to find someone familiar with telephone cabling to make the changes."

Making it central

Centralized wiring schemes lend modularity, the latest installation buzzword, to the network. Most people think of modularity as the RJ-11 telephone jacks they have at home.

"In a narrow focus, that's true. But modular systems aren't just defined by the use of jacks," says Doug Cabell, senior vice-president at Orion Network Solutions Group in Costa Mesa, Calif. "Any system that uses patch panels and wiring closets to facilitate changes in node use is modular. It eliminates rewiring."

Centralized wiring schemes like those used by Synoptics or IBM provide control in a distributed system.

At first glance, such schemes seem to be more expensive, since more wire is needed than in a bus topology. However, Freund maintains, "Any extra money spent on the cable will be made back in less than a year through savings on maintenance."

Many users are afraid of becoming locked in by wiring

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schemes. Freund, however, says it is possible to move ahead and still preserve your options. "It is possible to create a generic cabling scheme that does not follow any one company's particular specifications but will work with most vendors' products. I believe this centers around shielded twisted-pair.

"Unshielded twisted-pair is not appropriate in the way it is laid out or in its reliability," Freund continues. "Its loading characteristics are not conducive to corporate environments. It is less stable and has greater degradation than shielded twisted-pair."

Most experts agree with the first part of Freund's statement. Others, like Thomas, say they are quite happy with unshielded twisted-pair.

Thomas

Users need to examine their environments and resources for things like machine noise, distances between nodes, the availability of repeaters, the type and amount of traffic and radio interference. One thing is certain: The days of coaxial cable are numbered.

Twisted-pair wiring is also cutting into the growth curve of fiber-optic cable, says Eric Pearson, president of Pearson Technologies, a Canoga Park, Calif., systems integrator specializing in fiber-optic applications. "There is growth in the fiber-optic LAN market," Pearson says. "But many applications will not use fiber since the introduction of the twisted-pair Ethernet products."

Robinson

The result of this trend, Pearson says, is that "fiber will be used where its intrinsic advantages are greatest — where long distance and high bandwidth are key, as in backbones to connect several LANs, rather than at the desk top."

The distance limitations of fiber-optic cable are measured in miles instead of meters, and bandwidths as great as 200M bit/sec. have been achieved. Other advantages include immunity to electromagnetic and other types of interference.

The complexity of fiber stems from a number of factors. Even though the technology has been in existence for more than 30 years, there are few standards now in place.

Easing the confusion

One standard, the Fiber Distributed Data Interface (FDDI), should help ease some of the confusion as it becomes solidified. Already, most large-network vendors are committed to supporting it.

Although FDDI is currently appropriate only for large LANs, LAN linking or wide-area networks, having a standard for large networks will help, especially as the demand to connect departmental and institutional LANs increases.

Having FDDI as the wide-area solution will influence the local market in another way. FDDI is a token-passing ring that runs at 100M bit/sec. Its acceptance at the wide-area level should speed acceptance of token-ring in the local arena.

A troubling trend in the fiber-optic LAN market is the idea that users can install these networks themselves. Even if such efforts don't result in a faulty network, they almost always waste money.

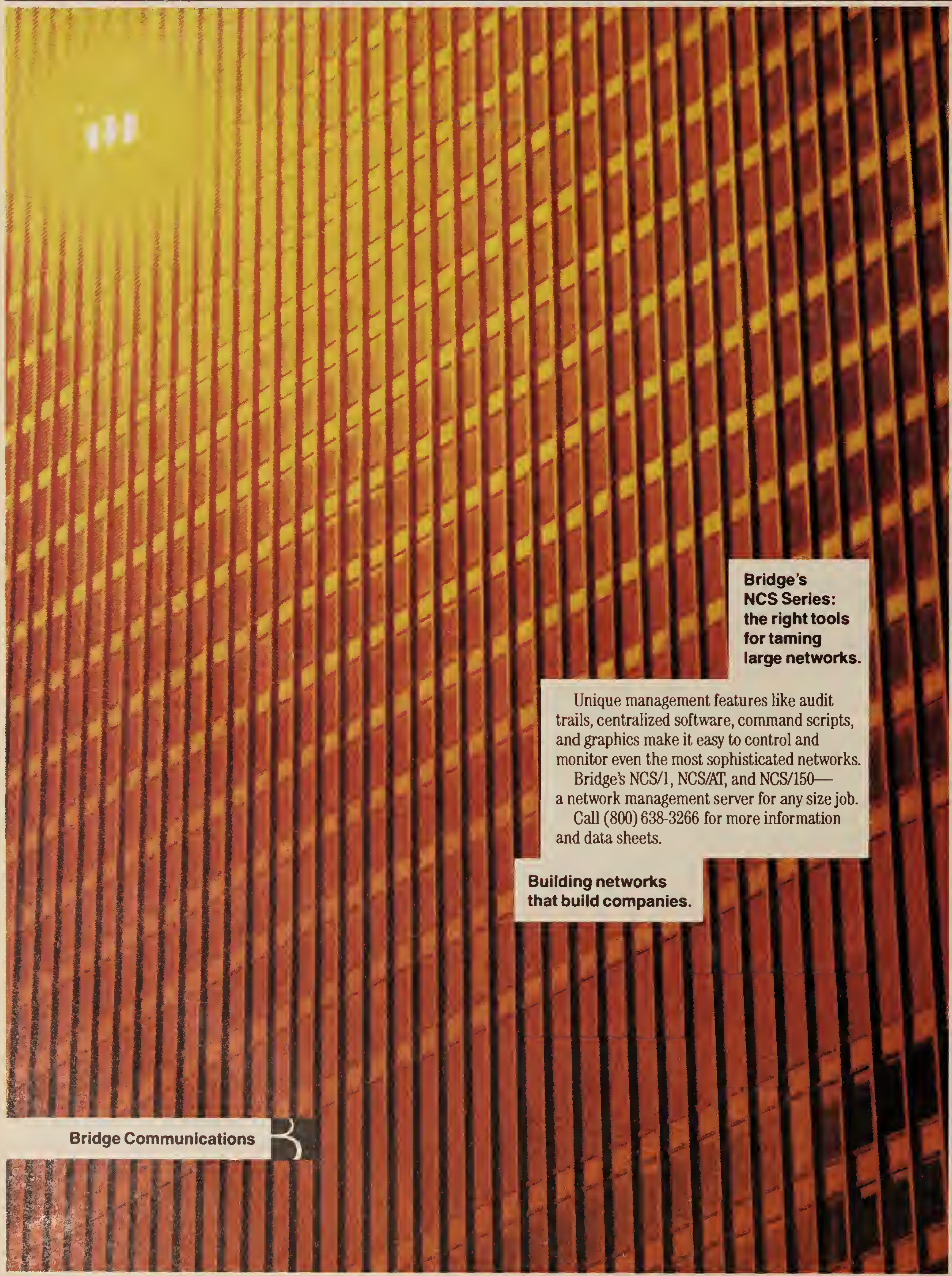
One development that may bring FDDI to smaller networks by making it more affordable is the introduction of an FDDI chip set from Advanced Micro Devices, Inc. in Sunnyvale, Calif. Called Supernet, this set of five chips accomplishes what previously took six expensive and cumbersome add-in boards to do.

Even with the FDDI chip set, however, the price/performance trade-offs of fiber-optic LANs are complicated. An extraordinarily large number of components are involved, most of which have no standards. Connectors, cable and optical components cannot be installed by anyone but an expert. A troubling trend in the fiber-optic LAN market, Pearson says, is the growing idea in some quarters that users can install fiber-optic networks themselves. Even if such do-it-yourself efforts don't result in a faulty network, they almost always waste money.

According to Pearson, "Some users don't spend enough time learning the cost/performance trade-offs. I saw a user spend something close to $150,000 more than he needed to. The LAN performed well, but it should not have cost as much as it did."

In addition, there are numerous configurations for these components. Finding the right one can save money and increase performance.

"One user I know of could have saved tens of thousands of dollars and 50% on duct space by using multiple fibers in each of the tubes pulled," Pearson says. "He just didn't know. LAN design is complicated enough. Fiber almost doubles the complexity." •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Reclaiming the LAN: MIS picks up the flag

BY LYLE ANDERSON

As local-area networks multiply and begin to connect, it is increasingly critical for MIS to take an active role at every stage of implementation. LANs must now be considered as front ends to the corporate network, not just as isolated pockets of computing in user departments.

Too often, organizations adopt two or three LAN software standards and implement them on an ad hoc, department-by-department basis. When networks were operating independently, such diversity was not a major problem. Now, however, users in almost every organization demand that their networks be connected with each other, to corporatewide networks and to host computers.

> IT HELPS to involve knowledgeable users when drafting standards and guidelines.

The job of MIS should be to define the appropriate LAN technology for the organization. Many issues cannot be left up to individual departments, including what industry standards the firm will support, if and how connections into the host computer will be provided and what levels of security and audit control are required.

Many users, one standard

The MIS organization should identify a set of LAN hardware, system software and applications that will satisfy most user requirements. Users can implement recommended hardware and software with minimal MIS involvement, but they must justify deviations from recommended standards. This way, MIS can channel users' enthusiasm into workable solutions and minimize potential problems in connecting LANs to other systems.

MIS can take into account emerging standards and vendor directions and, at the same time, enable users to implement workable solutions. The standards should not only identify the approved hardware and software but also define the respective roles of MIS and users and provide guidance in planning and implementing a LAN. A cost model that identifies the total cost of implementation, including training, administration and ongoing support costs, is also helpful.

Publishing a set of standards and guidelines is an effective way to begin to help users select a LAN and transfer the knowledge that different departments have gained in using them.

Creating and promulgating standards requires some diplomacy and consensus building. Users often complain that MIS is unresponsive and lacks the knowledge to guide them. Many users say, with some justification, that they know more about what is needed than MIS personnel because they are the ones who have had hands-on experience with LANs.

For this reason, it helps to involve knowledgeable users when drafting standards and guidelines and when disseminating standards throughout the organization. MIS can use the considerable experience of these users and gain their support in promoting compliance.

Responsibility for administration and day-to-day operation of the network must be defined. In fact, any LAN that links more than 25 to 30 workstations virtually requires a full-time administrator. Depending on the organization, responsibility for selecting an administrator may belong to MIS or to the users.

Many firms develop their own user manuals for LAN operation. A task-oriented manual can greatly simplify training and operation, especially when a number of casual users are on the network.

Consolidating support

Today, available LAN technology forces organizations to provide local support for each LAN installation. Typically, local support is provided by the user department, with assistance from the MIS department on an as-needed basis.

As LANs become more sophisticated and the necessary network management and support tools become available, support can begin to become more centralized, with MIS taking over more of the responsibility for supporting the network environment.

Centralizing backup and administration under MIS is desirable both for cost reduction and improved security.

The role the MIS organization plays in implementation can vary — from serving a source of information to outright ownership of the LAN. In any case, MIS will need to support this utility and provide a reliable and cost-effective infrastructure for end users. •

Anderson is director of DMR Group, Inc., an information management consulting firm based in White Plains, N.Y.

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LAN wiring with a twist

BY G. BERTON LATAMORE

Local-area networks are gaining muscle and losing bulk. As LAN shipments expand, so does interest in unshielded twisted-pair wiring as a cost-effective alternative to coaxial cabling.

As a telephone technology, unshielded twisted-pair seems to have been around forever. When it comes to digital networking, however, the medium has only really begun to infiltrate LAN sites within the last six months.

While unshielded twisted-pair accounted for only about one-tenth of 1% of 1987 LAN shipments, Doug Gold, senior research analyst for the LAN market at International Data Corp. (IDC) in Framingham, Mass., says user interest has been spurred by a number of recent network releases running on unshielded twisted-pair.

Ahead of the game

BBN, Inc., a diversified high-tech research and development company in Cambridge, Mass., is one step ahead of many users in employing twisted-pair for networking purposes. For the past 10 years, whenever telephone lines were installed in its expanding complex of buildings, BBN made sure that an extra three twisted-pair lines were added for each office to handle data communications. The network vendor uses Phonenet, an unshielded twisted-pair LAN based on Apple Computer, Inc. Appletalk protocols from Farallon Computing, Inc. for tasks both small and large.

"We use Phonenet to carry anything that someone might want to send from a Macintosh to a laser printer," says Ron Watkins, a network engineer at BBN. We also connect the Phonenet network to our corporate Ethernet and through that to a bank of [Digital Equipment Corp.] VAXs that host custom applications. We run those applications through the network so you can use them directly from a Macintosh over Phonenet."

Theoretically, most organizations already possess spare twisted-pair wiring that could be turned to this new use. "For years, AT&T installed extra wire whenever they put a phone in," IDC's Gold says. Unfortunately, existing wiring is not always usable — particularly if it is more than 10 years old.

Money saver

Even when installation of fresh wire is required, twisted-pair can save money. Not only is it less expensive and easier to string, but it is also easier to maintain. Adding a new device to a twisted-pair LAN is as simple as plugging it into a standard telephone jack. "Every desk is served by phone jacks, so we virtually eliminated recabling," says Joe Goodhart, a consultant with Wilmington, Del.-based ICI America, Inc.

ICI, an international chemical firm, chose Lattisnet, a 10M bit/sec. unshielded twisted-pair Ethernet from Synoptics Communications, Inc., when it wanted to unify various office automation functions. "We deliver Wang word processing off a VS100, serve a large DEC community, provide IBM System/36 and 38 and 5520 services and support a large number of 3270 devices and personal computers, all on unshielded twisted-pair," Goodhart says.

Easy expandability has made twisted-pair an insider favorite at the headquarters of Microage Computer Stores in Tempe, Ariz., according to Bruce Grant, director of technical support. "We also have a Token-Ring, an Arcnet and an Ethernet running on coaxial as test beds for various pieces of equipment that we sell," Grant says. "However, when we want to connect someone to the mainframe, it turns out that our 1M bit/sec. Starlan is one of the easiest networks to expand."

Twisted-pair does experience attenuation problems that limit line length to 330 feet. However, according to Jerry Culbert, president of Needham, Mass.-based Information Transport Systems, Inc., an engineering firm specializing in voice/data cable systems, few sites require longer reach. "We conducted a study of 45 locations showing that 98% of workstations are within about 245 feet of a wiring closet," he says.

Unshielded twisted-pair is also sensitive to fluorescent lights and copying machines. Culbert maintains, however, that these problems can be contained in most environments with proper precautions. Each pair should have its own separate sheath so that signal contamination can be contained, he says. Proximity to light fixtures can be avoided by installing the wiring in a cable rack or in ceiling or floor ducting.

The main barrier to using twisted-pair wiring on LANs is user skepticism, according to ICI's Goodhart. "At first," he says, "it is hard to convince users that a LAN running over telephone wire can deliver the level of service they need. But once users start working with twisted-pair, they fall in love with it — particularly when they see you can provide services anywhere within minutes instead of months." •

Latamore is a Burlington, Vt.-based free-lance writer.

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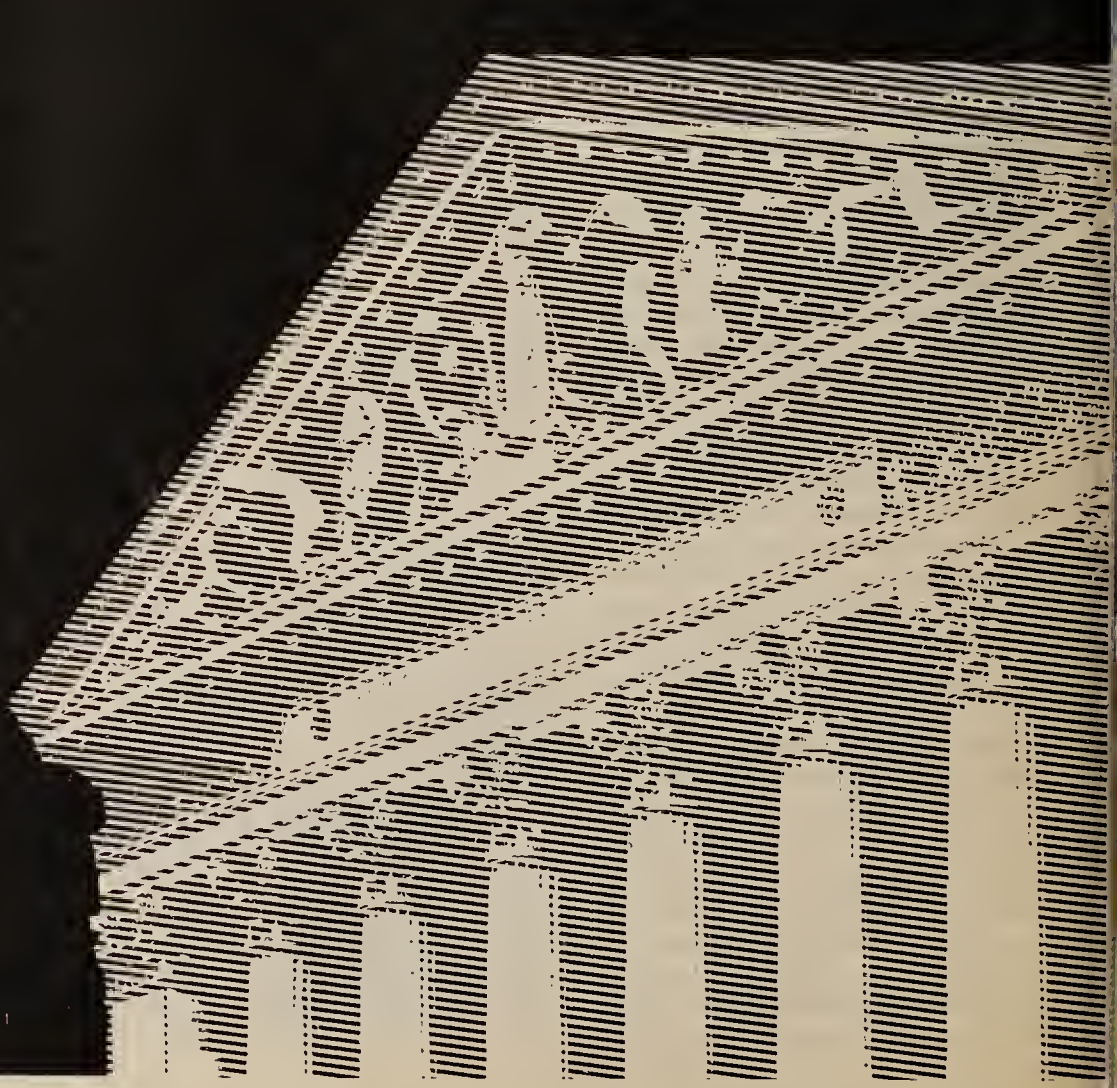

Arcnet survives, and battle moves on

BY THOMAS B. CROSS

Arcnet is not antiquated, as many of its critics charge. What it is, committed users say, is irrelevant. But then again, they say, so is Ethernet.

Arcnet was one of the first technologies to link various types of devices. Developed in 1977 at Datapoint Corp., it really took off when its token-bus technology was adapted for the IBM Personal Computer in 1982.

Since then, both the number of Arcnet users and the field of competing technologies have increased dramatically. With an operational speed of 2M bit/sec., the product has been surpassed by many other local-area network technologies operating at 10M bit/sec. and higher. With fiber-optic systems operating at more than 100M bit/sec., some industry observers forecast Arcnet's demise.

Last April, the Arcnet Trade Association (ATA) was formed to serve as a forum for users and to counteract those negative forecasts by promoting Arcnet as a viable technology with a future. However, even users active in ATA and bullish on Arcnet's prospects for survival say they now have more critical issues to worry about.

For a large quasi-federal lending agency, using Arcnet was initially an arrangement of necessity, according to Carrie Herr, strategic planner at the Reston, Va.-based company. Five years ago, when the organization wanted to network its personal computer-based file servers, Arcnet was used because few choices existed, she says. The organization now connects 26 file servers in 15 locations via 40M bit/sec. Etherlink cards.

While Herr uses both Arcnet and Ethernet, she says she likes the former as a "low-end, low-budget, generic system." She says that for small companies or departments, Arcnet vs. Ethernet is not the question; rather, the network operating system is what will make the difference.

The real issue for Herr is in the lines of code written to interface the firm's Novell, Inc. Netware network operating software with Arcnet. "We grew up with Novell and are mired down with such an investment that you can't really move away from that easily," she says.

Always the underdog

Donald Dornbush, director of data processing for the Michigan Education Data Network Association in East Lansing, Mich., an early Arcnet user, says the technology has always been a stepchild to other systems. Nevertheless, he adds, Arcnet remains a key technology for a number of reasons:

- It is an easy topology to work with and to install. With a ring topology, the entire network's operation depends on each connection's integrity. With a bus topology, the network can be extended as far as necessary, and one bad connection will not disrupt the entire network.
- It is predictable and reliable.
- The low cost of Arcnet boards makes the technology cost-effective.
- It works with a wide range of software.
- It has a strong potential for faster speeds, a factor on which Datapoint is currently working.

Paul Obradovic, a telecommunications engineer with Southern California Edison, has more than 700 nodes on Arcnet running Netware. The principal reason for his company's choosing Arcnet, he says, was cost.

Obradovic says he likes the speed and performance of Arcnet as well as its reliability. His organization is expanding its network and is looking for gateways to wide-area networks and T1 circuits.

B. J. Hall, founder of Hallcom Network Systems in Denver, a LAN system integrator, says, "Arcnet is like a Chevrolet, and most people do very well with a Chevrolet. However, it's not so much Arcnet nor is it how many nodes: It's what you do with them."

Given its large installed base and popularity among users looking for low-cost, efficient LAN solutions, Arcnet is not likely to either fade away or surrender to Ethernet. In fact, there is room for both in a world in which, with LAN board prices dropping, hardware choices are becoming a side issue. Network operating software is the ground on which future connectivity battles will be fought. ●

> "ARCNET is like a Chevrolet, and most people do very well with a Chevrolet."
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Cross is vice-president of Cross Information Co. in Boulder, Colo., and the author of several books on communications.

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VENDOR VIEWPOINT

A standard for fast times

BY HOWARD SALWEN

Terminal-to-host connections were sufficient to answer most communications needs during the early 1980s. Today, however, the emphasis has shifted to high-speed, host-to-host and LAN-to-LAN communications. These new requirements have spurred demand for a high-speed, fiber-optic-based communications standard. The Fiber Distributed Data Interface (FDDI) is such a standard.

FDDI is the first standard tailored for complex communications. Its 100M bit/sec. data rate is 25 times faster than IEEE 802.5-based networks and 10 times faster than Ethernet. But it still far from stretches the limits of fiber-optic media.

The standard's token-ring architecture provides predictable network access and features two counter-rotating rings for fault-tolerant bidirectional communications. In contrast to 802.5 token-ring networks, which allow packets from any one node to circulate on the ring at any given time, FDDI networks can carry packets from several nodes simultaneously for greater speed and capacity.

In addition to speed and accuracy, FDDI offers the typical advantages of fiber-optic cabling. Multimode fiber supports node-to-node distances of up to two kilometers and protects data from signal degradation.

More specifically, networks in harsh or noisy environments can benefit from fiber-optic cable's immunity to electrical interference and electromagnetic and radio frequency interference radiation.

The FDDI standard will provide a solid foundation on which to build networks for more complex communications tasks such as transferring graphics images or other large data packets at high speeds. FDDI will also become the standard for backbone networks that support data transfers between different local-area network systems.

While FDDI will have a major impact on the networking industry, definition and ratification of the FDDI standard is less certain. Several companies are currently working on FDDI chip sets. Chip set development is a tremendous challenge, however, and several major pieces of the puzzle are still undefined.

Station management, for example, which addresses such concerns as how a token is put on the ring, has yet to be decided. In addition, configuration parameters, including the size of the fiber and the type of connectors to use, need to be defined. A complete chip set will guarantee FDDI's viability as a standard by ensuring interoperability among products from different vendors.

> WHILE FDDI will have a major impact on the networking industry, definition and ratification of the FDDI standard is less certain.

Even after the FDDI standard is fully defined, it will take some time for the standard to become commercially available. In the case of the 802.5 standard for 4M bit/sec. token-ring networks, almost two years passed between the time good chips were first available and when 802.5 interface boards were commercially available. Since the FDDI network is faster and more complex than the 802.5 standard, the wait for FDDI-compatible products could be even longer.

At this point, FDDI networks are at least a year and a half away from commercial availability. It is certain, though, that when interoperable FDDI-standard products become available, they will have a hungry market to satisfy. ●

Salwen is chairman and chief technical officer at Proteon, Inc. in Westboro, Mass.

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ACS Telecom **(213) 325-3055**	10 CAD Plus	Proprietary	Twisted-pair	Baseband	Yes	Yes	Bus	32	1M	CSMA/CA/ CD[2]	2,000 ft	10,000 ft	10,000 ft	$995
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Agile Systems, Inc. **(214) 242-4307**	AN20/PC	RS-232 networks	Twisted-pair	Broadband	Yes	Yes	Bus	64	0.1M	CSMA/CD	2,000 ft	4,000 ft	4,000 ft	$448
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Apollo Computer, Inc. **(617) 256-6600**	802.3 Network Controller, 802.3 Network Controller VME	Unix System V, Unix 4.2, Aegis, Sun Network File System, DFS	Standard Ethernet, twisted-pair, coax	Either	Yes	Yes	Backbone with drops	Per 802.3 specs	10M	CSMA/CD	Per 802.3 specs	Per 802.3 specs	Per 802.3 specs	$1,350-$4,000
	Apollo Token Ring	AT&T Unix System V, Berkeley Unix 4.2, Aegis, Sun Network File System, DFS	Coax	Baseband	No	—	Token-ring	Unltd	12M	Token passing	NA	Unltd	1,000 m	$1,300 (Series 3000, 4000 Personal Workstations)
Applied Knowledge Groups, Inc. **(408) 739-0300**	The Knowledge Network	MS-DOS, PC-DOScompatibles	Twisted-pair	Baseband	No	Yes	Peer-to-peer	6	9.6M	CSMA/CA/ CD	1,000 ft	1,000 ft	300 - 400 ft	$149.50
Applitek Corp. **(617) 246-4500**	Baseband, broadband, fiber-optic LANs	PSOS	Baseband, broadband, fiber-optic	Either	Yes	Yes	Tree	—	10M	Unilink, IEEE 802.3	—	20 miles	—	$500-$1,000 (per system)
Artel Communications Corp. **(617) 562-2100**	Fiberway	Ethernet, 802.3, fiber-optic	—	Baseband	Yes	Yes	Ring	128	100M	Token passing	NA	NA	13,000 ft	Information not provided
Artisoft, Inc. **(602) 293-6363**	Lantastic	Netbios compatible, runs on IBM PC LANs, Netware	Twisted-pair	—	Yes	Yes	Bus	500+	2M	CSMA/CA/ CD	4,000 ft	5,000 ft	4,000 ft	$199
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BMB Compuscience Canada, Ltd. **(416) 876-4741**	Imaginet	All	Twisted-pair	Baseband	Yes	Yes	Hierarchical or distributed bus	63 work-stations per server	2M	SDLC[4]	Unltd	Unltd	2,000 ft	$695
Bridge Communications (a division of 3Com Corp.) **(415) 969-4400**	PCS/1	All	Coax, fiber-optic	Either	Yes	Yes	All	Unltd	10M	CSMA/CD	500 m	2,500 m	500 m	$1,195
	TCPTerm	All	Coax, fiber-optic	Baseband	NA	NA	All	Unltd	10M	CSMA/CD	500 m	2,500 m	500 m	$300
	Tokenterm	All	Coax, fiber-optic	Baseband	NA	NA	All	Unltd	10M	CSMA/CD	500 m	2,500 m	500 m	$300
	Etherterm	All	Coax, fiber-optic	Baseband	NA	NA	All	Unltd	10M	CSMA/CD	500 m	2,500 m	500 m	$300
Broadtech Corp. **(714) 773-1820**	RPTI Network Card	IBM PC and compatible environments	Twisted-pair, coax	Baseband	Yes	Yes	Bus	255	1M, 10M	—	1,000 ft	3,000 ft	20 ft	$240-$350
CMC **(800) 262-8023**	Ethernet Intelligent Processors	Netbios	Coax, thin Ethernet	Baseband	Yes	Yes	Bus	1,024	10M	CSMA/CD	1,500 ft	2.8 km	2.8 km	From $895
Codenoll Technology Corp. **(914) 965-6300**	Codenet 3051	Any supporting Ethernet IEEE 802.3	Fiber-optic	NA	Yes	No	Star	1,024	10M	CSMA/CD	3,300 ft	14,850 ft	—	$995
	Codenet 3041	Any supporting Arcnet	Fiber-optic	NA	No	No	Star	—	2.5M	Token passing, bus	3,300 ft	NA	—	$695
	Codenet 3410	Any supporting 802.3 MAP	Fiber-optic	NA	No	No	Star	254	10M	Token passing, bus	3,300 ft	NA	—	$1,700
	Codenet 3061	Netbios	Fiber-optic	NA	No	No	Star	256	10M	CSMA/CD	3,300 ft	NA	—	$1,195
Compupro/Viasyn Corp. **(415) 786-0909**	The Net 100A	Concurrent DOS, DR-Net	Coax	Broadband	No	No	Modified star	255	3.2M	—	150 ft	1,000 ft	1,000 ft	$350
	Arcnet PC	Netware, DR-Net	Coax	Broadband	No	No	PC bus	255	3.2M	—	150 ft	1,000 ft	1,000 ft	$350
Computer Network Technology Corp. **(800) 638-8324**	Lanlord	MVS, COS, Unicos environments	Coax	Baseband	Yes	Yes	Bus	500	25M	CSMA/CA	4,000 ft	Unltd	NA	Information not provided
Computer Pathways, Inc. **(206) 487-1000**	Grapevine	Proprietary, Netbios, MS-DOS 3.1	Coax, twisted-pair	Broadband	No	Yes	Bus	50	3.6M	CSMA/CA	4,000 ft	4,000 ft	4,000 ft	$595

[1] Carrier-sense multiple access with collision detection [2] CDMA with collision avoidance and CD [3] Transmission Control Protocol/Internet Protocol [4] Synchronous Data Link Control [5] Open Systems Interconnect [6] CDMA with collision elimination

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld.* Further product information is available from the vendors.

COMPANY	PRODUCT	NETWORK OPERATING SYSTEMS SUPPORTED	CABLE TYPES SUPPORTED	BASEBAND OR BROADBAND	ON-BOARD COPROCESSOR	ON-BOARD MEMORY	WIRING TOPOLOGY	MAXIMUM NODES PER NETWORK	DATA RATE (BIT/SEC.)	ACCESS OR SIGNALING SCHEME	MAXIMUM LENGTH WITHOUT REPEATERS	MAXIMUM LENGTH WITH REPEATERS	MAXIMUM DISTANCE BETWEEN NODES	PRICE PER CARD
Concord Communications, Inc. **(617) 460-4646**	Mapware	MAP	Coax	Broadband or carrier band	Yes	Yes	Branching tree	Unltd	10M	Token-bus, IEEE, 802.4	25 miles	25 miles	25 miles	$2,595-$4,000
Contel Business Networks **(404) 395-8705**	Contelnet 1000 PC LAN	DOS environment	Coax Ethernet, fiber-optic, twisted-pair	Either	Yes	Yes	Any	8,000	1M - 10M	CSMA/CD, token-ring	250 ft (twisted-pair), 500 m (Ethernet coax), 2,000 ft (fiber-optic)	4½ km	4½ km	$495
	Contel 6000 Token-Ring Backbone LAN	—	Fiber-optic, shielded twisted-pair	Baseband	Yes	Yes	Star, distributed star, ring	240	10M or 80M	Token-ring	2 km	480 km	2 km	$4,000 (port to backbone)
	Contelnet 3000 Terminal-to-Host LAN	TCP/IP, Xerox Network Systems, OSI[5]	Coax Ethernet, fiber-optic, twisted-pair	Either	Yes	Yes	Any	8,000	1M - 10M	CSMA/CD, token-ring	500 m (baseband), 2,000 ft (broadband)	4½ km (baseband), 5 miles (broadband), 20 miles (token-ring)	4½ km (Ethernet), 5 miles (broadband), 20 miles (token-ring)	From $280
Corvus Systems, Inc. **800-4-CORVUS**	Omninet Network Interface Card for Apple IIE and Macintosh	Constellation III, Apple	Twisted-pair, fiber-optic	Baseband	No	Yes	Bus, star, combination	64	1M	CSMA/CA	1,000 ft	8,500 ft	8,500 ft	$249
	Omninet for IBM	Netware, PC-NOS, Constellation	Twisted-pair, fiber-optic	Baseband	No	Yes	Bus, star, combination	64	1M	CSMA/CA	1,000 ft	8,500 ft	8,500 ft	$249
Data General Corp. **(617) 870-6716**	Professional DG Starlan Controller	PC-Net supporting MS-DOS 3.1	Twisted-pair	Baseband	No	Yes	Hierarchical star	1,024	1M	CSMA/CD	8,000 ft	—	1,600 ft	$650
	Professional LAN Controller	(See entry above)	RG-9 thick, RG-58 thin Ethernet	Baseband	—	Yes	Daisy chain, backbone with drops	—	10M	CSMA/CA	600; 1,600 ft	8,000 ft	600, 8,000 ft	$825
Datapoint Corp. **(512) 699-4427**	RIM (for IBM PCs and compatibles)	Proprietary, RMS, MS-DOS	Coax, twisted-pair, fiber-optic	Either	Yes	Yes	Multicentric star, token-bus	255	2.5M	Token passing	2,000 ft	22,000 ft	22,000 ft	$395
	POUA (for serial devices and terminals)	(See entry above)	Coax, twisted-pair, fiber-optic	Either	Yes	Yes	Multicentric star, token bus	255	2.5M	Token passing	2,000 ft	22,000 ft	22,000 ft	$295
David Systems, Inc. **(408) 720-8000**	David Information Manager	IEEE 802.3 compatibles; Vines, Netware, 3Com	Twisted-pair	Baseband	Yes	Yes	Star	3,000	10M	CSMA/CD	2,000 ft	To 2,000 miles	2,000 miles	From $695
Develcon Electronics **(800) 423-9210**	Develnet	TCP/IP	Thick, thin Ethernet	Baseband	Yes	Yes	All	512	10M	CSMA/CD	4 km	250 km	4 km	$200
DNA Network, Inc. **(215) 296-7420**	DNA Network	Proprietary	Twisted-pair	Baseband	Yes	Yes	Multidrop star, daisy chain	64	2.5M	Polling	5,000 ft	NA	5,000 ft	$395
Earth Computers Technology **(714) 964-5784**	Earthnet-I	Netware, Network OS, Arcnet	Coax	Baseband	No	Optional	Star	255	2.5M	Token passing	2,000 ft	10,000 ft	2,000 ft	$199
Easynet Systems, Inc. **(416) 273-6410**	Easynet 116	MS-Net	Shielded twisted-pair, coax	Baseband	No	No	Distributed bus	20	1M	CSMA/CA/CD	2,500 ft	Unltd	2,500 ft	$239
Excelan, Inc. **(408) 434-2300**	Excelan Open System (Exos)	Unix System V, RSX, VMS, MicroVMS, MS-DOS, Xenix	Ethernet	Baseband	Yes	Yes	Bus	1,024	10M	CSMA/CD	500 m	2,500 m	2,500 m	From $795
Fibronics International, Inc. **(617) 778-0700**	System Finex and FDDI-Based Unit	TCP/IP, ISO	Fiber-optic	Baseband	No	Yes	Star	500	100M	Token-ring	6,600 ft	6,600 ft	6,600 ft	$36,000
Fortune Systems Corp./ SCI Technology, Inc. **(415) 593-9000**	Fortune:Link	Proprietary, Unix, MS-DOS, XNS	Coax	Baseband	—	—	Bus, tree	255	2.5M —	Token passing	—	—	—	Information not provided
Gateway Communications, Inc. **(714) 553-1555**	G/Token-Ring	Netware, Netbios	Twisted-pair	Baseband	No	Yes	Token-ring	260	4M	Token passing	150 ft	300 ft	150 ft	$650
	G/Ethernet	Netware	Standard, thin Ethernet	Baseband	No	Yes	Backbone, daisy chain	30, 100	10M	CSMA/CD	1,500 ft	4,500 ft	1,500 ft	$395
	G/Net	Netware	RG-58, RG-59, RG-62	Baseband	No	Yes	Daisy chain	255	1.4M	CSMA/CD/CA	4,000 ft	4 miles	4,000 ft	$395
Gould Inc. (Computer Systems Division) **(305) 587-2900**	Ethernet Controller	Sun Network File System, Freedomnet	Coax, thin wire, fiber-optic	Both	Yes	Yes	Backbone with drops, daisy chain	Per Ethernet 1.0, 2.0, 802.3 specs	10M	CSMA/CD	Per Ethernet 1.0, 2.0, 802.3 specs	Per Ethernet 1.0, 2.0, 802.3 specs	Per Ethernet 1.0, 2.0, 802.3 specs	$4,250
	VME Ethernet Controller	(See entry above)	Coax, thin wire, fiber-optic	Either	Yes	Yes	Backbone with drops, daisy chain	Per Ethernet 1.0, 2.0, 802.3 specs	10M	CSMA/CD	Per Ethernet 1.0, 2.0, 802.3 specs	Per Ethernet 1.0, 2.0, 802.3 specs	Per Ethernet 1.0, 2.0, 802.3 specs	$7,500
	Pronet-80 P1680 Gould Selbus	—	Shielded twisted-pair, fiber-optic, infrared	—	—	Yes	Star	240	80M	Token passing	2 km (fiber)	—	—	$6,900 (P1680 from Proteon), $5,000 (HSD from Gould)
	A470 SEL 32, A400 General-Purpose Minicomputer, Hyperchannel adapters	Sun Network File System, Freedomnet	Coax	Baseband	—	Yes	Backbone with drops	64	50M	CSMA/CA	1,000 ft	—	Unltd	$5,000 (HSD from Gould)
Hewlett-Packard Co. **(408) 725-8111**	HP Starlan	MS-Net, Netbios	Twisted-pair	Baseband	Yes	Yes	Distributed star with backbone	9,000	1M	CSMA/CD	3,000 ft	52,000 ft	52,000 ft	$300-$8,000

COMPANY	PRODUCT	NETWORK OPERATING SYSTEMS SUPPORTED	CABLE TYPES SUPPORTED	BASEBAND OR BROADBAND	ON-BOARD COPROCESSOR	ON-BOARD MEMORY	WIRING TOPOLOGY	MAXIMUM NODES PER NETWORK	DATA RATE (BIT/SEC.)	ACCESS OR SIGNALING SCHEME	MAXIMUM LENGTH WITHOUT REPEATERS	MAXIMUM LENGTH WITH REPEATERS	MAXIMUM DISTANCE BETWEEN NODES	PRICE PER CARD
Hewlett-Packard Co. (408) 725-8111	HP Starlan 10	(See entry above)	Twisted-pair	Baseband	Yes	Yes	Distributed star with backbone	9,000	10M	CSMA/CD	3,000 ft	52,000 ft	52,000 ft	$300-$8,000
	HP Thinlan	(See entry above)	Thin coax	Baseband	Yes	Yes	Distributed star with backbone	9,000	10M	CSMA/CD	3,000 ft	52,000 ft	52,000 ft	$300-$8,000
	HP Thicklan	(See entry above)	Thick coax	Baseband	Yes	Yes	Distributed star with backbone	9,000	10M	CSMA/CD	3,000 ft	52,000 ft	52,000 ft	$300-$8,000
Honeywell Bull, Inc. (617) 895-6000	LGU 1000	ISO	Thin or thick Ethernet	Baseband	No	Yes	Daisy chain, backbone with drops	30, 100	10M	CSMA/CD, IEEE 802.3	600 or 1,680 ft	2,600; 8,200 ft	2,600; 8,200 ft	$520
	LCN9901, LEM9901	ISO	Thick Ethernet	Baseband	Yes	Yes	Backbone with drops	100	10M	CSMA/CD, IEEE 802.3	1,680 ft	8,200 ft	1,680; 8,200 ft	$1,000-$3,000
IBM (800) IBM-2468	Adapter/A, 8228 Multistation Access Unit	PC-DOS, OS/2 Extended	IBM Types 1-3	Either	No	Yes	Star-wire	260 per token-ring (Types 1, 2); 72 (Type 3)	4M	Token-passing	990; 330 ft	2,500 ft	990; 330 ft	$795 (Adapter/A); $695 (8228)
Intecom, Inc. (800) INTE-800	Lanmark	All	Twisted-pair, coax, Ethernet	Baseband	Yes	Yes	Star	16,384	1M per user	CSMA/CD	Unltd	Unltd	Unltd	Information not provided
Kaypro Corp. (800) 4-KAYPRO	PC Network	Netware	Coax	Broadband	No	No	Token-ring	100	2.5M	—	200 ft	—	200 ft	$259
Kimtron Corp. (408) 436-6550	XL-100-1	K-NOS, Network OS, PC-Net	Double twisted-pair	Baseband	No	No	Daisy chain	125	1.8M, 1.4M, 0.7M	CSMA/CD	2,000 ft	4,000 ft	2,000 ft	$299
	Ethernet	K-NOS, Network OS, Netware	Coax	Baseband	Yes	Yes	Daisy chain	255	10M	CSMA/CD	2,000 ft	10,000 ft	1,000 ft	$399
	Arcnet	K-NOS, Network OS, Netware	Coax	Baseband	Yes	Yes	Daisy chain, distributed star	255	2.5M	Token passing	2,000 ft	4,000 ft	1,000 ft	$299
Lanex Corp. (301) 595-4700	Lanex LAN	TCP/IP, Netbios	Coax	Broadband	No	No	Bus	To 64,000	2M	CSMA/CD	10+ miles	10+ miles	10+ miles	$300-$600 (per connection)
Lanmaster (division of Vestra-Subco, Inc.) (817) 771-2124	Arcmaster	Netware, Vines, Lifenet	Coax, twisted-pair, fiber-optic	Baseband	Yes	Yes	Star, bus	255	2.5M	Token passing	2,000; 10,000 ft	20,000 ft; unltd	2,000; 10,000 ft	$350
	Arcmaster/2 for IBM PS/2 family	(See entry above)	Coax, twisted-pair, fiber-optic	Baseband	Yes	Yes	Star, bus	255	2.5M	Token passing	2,000; 10,000 ft	20,000 ft; unltd	2,000; 10,000 ft	$795
Localnet Communications, Inc. (714) 549-7942	D-Link Twisted Pair	IBM PC and compatible operating systems	Twisted-pair	Baseband	Yes	Yes	Bus	255	1M	CSMA/CD	1,000 ft	4,000 ft	4,000 ft	$700
	D-Link Ethernet	Netware, PC LAN	RG-58, thick or thin Ethernet	Baseband	Yes	Yes	Distributed bus	150	10M	CSMA/CD	300; 500 m	1,500; 2,800 m	2,800 m	$850
Magna Computer Corp. (603) 622-3699	Magnet Ethernet	MS-Net, Netware, 3Com	Ethernet coax, Thinnet coax	Baseband	Yes	Yes	Backbone with drops	100	10M	CSMA/CD	1,500; 600 ft	7,500; 500 ft	7,500; 500 ft	Information not provided
	Magnet Starlan	MS-Net, Netware	Twisted-pair	Baseband	Yes	Yes	Star	100	1M	CSMA/CD	500 ft	1,500 ft	1,500 ft	Information not provided
Micom-Interlan, Inc. (617) 263-9929	N15210 Data Link Controller	PC-Bus	Coax, twisted-pair, unshielded twisted-pair	Baseband	—	Yes	Ethernet backbone, thin Ethernet, Starlan, distributed Starlan, daisy chain	—	10M	CSMA/CD	—	—	—	$395
	NP300 Protocol Processor Board	Multibus, Unix System V.3	Coaxial	Baseband	Yes	Yes	Ethernet backbone	100 without repeater	10M	CSMA/CD	—	—	—	$1,690
	NP200 Protocol Processor Board	Q-bus Microvax, MicroVMS	Coaxial	Baseband	—	Yes	Ethernet backbone	100 without repeater	10M	CSMA/CD	—	—	—	$2,490
	NP100 Ethernet Protocol Processor Board	VAX/VMS, RSX, Unibus	Coaxial	Baseband	—	Yes	Ethernet backbome	100 without repeater	10M	CSMA/CD	—	—	—	$3,290
	NP600 Protocol Processor Board	Unix V.3, Netware 2.0, MS-DOS 3.0 and higher, Xenix 2.0 and higher, AIX	Coax, unshielded, shielded twisted pair	Baseband	Yes	Yes	Ethernet backbone, thin Ethernet, Starlan, distributed Starlan, daisy chain	—	10M	CSMA/CD	—	—	—	$895
Micro Technology, Inc. (714) 632-7580	MEQNA	Decnet-VAX, Vaxlan, Decnet-RSX, Decnet/E, MicroVMS/ RSX, RSX-11S, LAVC, RSX-11M	Coax and thin Ethernet	Baseband	Yes	Yes	Backbone with drops	1,023	10M	CSMA/CD	1,640 ft	8,202 ft	8,202 ft	$2,250
MNC International/ Quam Corp. (612) 788-1099	Quam Arcnet LAN products	MS-DOS	Coax, fiber-optic, twisted-pair	Baseband	Yes	Yes	Physical star, logical ring	255	2.5M	Token passing	4,000 ft	57 miles	4,000 ft	$199
Motorola Computer Systems (800) 556-1234 ext. 165	LC2004/MVME 330A	Unix	Coax	Baseband	Yes	Yes	Bus	500	10M	CSMA/CD	1,640 ft	8,200 ft	8,200 ft	$3,045
	LC2001/MVME 330B	Unix	Coax	Baseband	Yes	Yes	Bus	500	10M	CSMA/CD	1,640 ft	8,200 ft	8,200 ft	$1,995
NBI, Inc. (800) 922-8828 ext. 300	NBI Net	Unix, Ethernet, TCP/IP, FTP	Coax	Baseband	Yes	Yes	Bus	255	10M	—	1,650 ft	8,250 ft	8,250 ft	$1,900
	Multinet	MS-Net	Twisted-pair	—	Yes	Yes	Bus	64	1M	—	1,500 ft	4,500 ft	4,500 ft	$595
Networth, Inc. (800) 544-5255	VLan+	Advanced Netware	Single twisted-pair, unshielded	Baseband	No	No	Linear bus, star	64	0.8M	CSMA/CE[6]	1,000 ft	25,000 ft	1,000 ft	$350

COMPANY	PRODUCT	NETWORK OPERATING SYSTEMS SUPPORTED	CABLE TYPES SUPPORTED	BASEBAND OR BROADBAND	ON-BOARD COPROCESSOR	ON-BOARD MEMORY	WIRING TOPOLOGY	MAXIMUM NODES PER NETWORK	DATA RATE (BIT/SEC.)	ACCESS OR SIGNALING SCHEME	MAXIMUM LENGTH WITHOUT REPEATERS	MAXIMUM LENGTH WITH REPEATERS	MAXIMUM DISTANCE BETWEEN NODES	PRICE PER CARD
Networth, Inc. (800) 544-5255	VNet	Advanced Netware, except ELS	Single twisted-pair, unshielded	Baseband	No	No	Linear bus, star	128	1.3M	CSMA/CE	1,000 ft	25,000 ft	1,000 ft	$495
The NTI Group (408) 739-2180	Desnet	Netbios, including PC-Net, Vianet, Tapestry	Coax, twisted-pair, fiber-optic	Either	Yes	Yes	Bus, ring	254	2M or 10M	CSMA/CD	5,000 ft (fiber-optic)	15,000 ft	15,000 ft	$350-$600
Novell, Inc. (Hardware Products Division) (408) 729-6700	Novell Ethernet NE1000 (Network Interface Card)	Netware	Coax, thin, thick Ethernet	Baseband	No	Yes	Linear bus, daisy chain, backbone	296	10M	CSMA/CD	984 ft (thin Ethernet), 1,640 ft (thick Ethernet)	2,952 ft	3,280 ft	$395
Orchid Technology, Inc. (415) 683-0300	PCNet	Advanced Netware, proprietary	Coax	Baseband	No	Optional	Distributed bus	255	1M	CSMA/CD	3,000 or 7,000 ft	—	7,000 ft	$495
	PCNet-2	(See entry above)	Coax	Baseband	No	Optional	Distributed bus	255	1M	CSMA/CD	3,000 or 7,000 ft	—	7,000 ft	$495
Pajac Systems, Inc. (617) 863-0613	Supersonic	Netware	Twisted-pair, coax (CATV type)	Baseband	No	Yes	Linear bus, star	250 per cluster	16M	Polling linear	1,000 ft	10,000 ft	1,000 ft	$365-$465
PC Office, Inc. (619) 268-3235	LAN Adapter	All Netbios including Netware, Tapestry, Network OS	Twisted-pair	Baseband	Yes	Yes	Bus, star, bus from star hub	255	2.5M	CSMA/CD	500 - 1,200 ft	12,000 ft	500 - 1,200 ft	$295
Prime Computer, Inc. (617) 655-8000	LHC300	Primos	IEEE 802.3 AUI	Baseband	Yes	Yes	Bus with drops	1,000	10M	CSMA/CD	1,640 ft	8,202 ft	500 or 2,500 ft	$5,000
Proteon, Inc. (617) 898-2800	P1000/P1200 Unibus/Multibus Interface	TCP/IP	IBM Type 1, Type 6; fiber-optic	Baseband	No	No	Distributed star	255	10M	Token-ring	780 ft	Unltd	—	$2,000-$3,150
	P1100 Q-Bus Interface	TCP/IP	(See entry above)	Baseband	No	No	Distributed star	255	10M	Token-ring	780 ft	Unltd	—	$2,700
	P1500 VME Interface	TCP/IP	(See entry above)	Baseband	No	No	Distributed star	255	10M	Token-ring	780 ft	Unltd	—	$2,700
	Pronet-10 P1300, P1303	Netware, Vines, TCP/IP for MS-DOS	IBM cabling system, fiber-optic, microwave, infrared, broadband	Either	No	Yes	Ring of stars	255	10M	Token passing	1,584 ft	75,000 miles	1,584 ft	$545-$595
	Pronet-4 P1340, P1344	Netware, Vines, IBM PC LAN, TCP/IP for MS-DOS	(See entry above)	Either	No	Yes	Ring of stars	260	4M	Token passing	660 ft	1,235 ft	660 ft	$695
	P1240 Multibus Interface	TCP/IP	IBM Type 1, IBM Type 6, fiber-optic	Baseband	Yes	Yes	Distributed star	260	4M	Token-ring	1,192 ft	Unltd	2,500 ft	$2,800
	P1503 Interface	TCP/IP	—	Baseband	No	No	Distributed star	255	10M	Token-ring	780 ft	Unltd	—	$2,700-$4,350
	P1580, P1380, P1080, P1680, P1180, P1503	TCP/IP, Decnet	Fiber-optic, IBM Type 1	Baseband	No	Yes	Star-shaped ring	240	80M	Token-passing ring	17,000 ft	1,570,000 ft	6,500 ft or 75 ft	$4,900-$8,000
	P1242 Multibus Interface	TCP/IP	IBM Type 1, Type 6, fiber-optic	Baseband	No	No	Distributed star	260	4M	Token-ring	1,192 ft	Unltd	2,500 ft	$2,000
	P1542 VMEbus Interface	TCP/IP	(See entry above)	Baseband	No	No	Distributed star	260	4M	Token-ring	1,192 ft	Unltd	2,500 ft	$2,200
Pure Data Ltd. (416) 731-6444	PDI508	Netware, Vines, Lifenet	Coax, fiber-optic, twisted-pair	Baseband	No	No	Tree, distributed star	255	2.5M	Token passing	2,000 ft (coax), 3½ km (fiber-optic)	20,000 ft (coax), 35 km (fiber-optic)	20,000 ft (coax), 35 km (fiber-optic)	$395
	PDIUC508	(See entry above)	Coax, fiber-optic, twisted-pair	Baseband	No	No	Tree, distributed star	255	2.5M	Token passing	2,000 ft (coax), 3½ km (fiber-optic)	20,000 ft (coax), 35 km (fiber-optic)	20,000 ft (coax), 35 km (fiber-optic)	$895
Quadram Corp. (404) 564-5637	Quadstar LAN	Netbios, Tapestry	Twisted-pair	Baseband	Yes	Yes	Star	50	1M	IEEE 802.3 CSMA/CD	800 ft	—	800 ft	$375-$795
RAD Data Communications Ltd./ Lannet Data Communications (201) 587-8822	LE-6, LE-8	Ethernet	Two twisted-pair	Baseband	NA	NA	Star	—	10M	CSMA/CD	3,280 ft	3,280 ft	820 ft	$450-$650 (per node)
Server Technology, Inc. (408) 738-8377	Easylan	Netbios-compatible	Twisted-pair	Broadband	No	No	Bus	20	To 56K	—	1,000 ft	—	1,000 ft	$125-$135
Siecor Corp. (704) 327-5000	Fiber-Optic Ethernet Active Star System	Any supporting Ethernet IEEE 802.3	Fiber-optic	Baseband	NA	NA	Star	1,024	10M	CSMA/CD	13,200 ft	13,200 ft	13,200 ft	$1,100 (per node)
	Fiber-Optic Token-Ring Media System	Token-ring, IEEE 802.5	Fiber-optic	Baseband	NA	NA	Star	Unltd	4M or 16M	Token passing	—	NA	NA	$1,295 (per node)
SIIG, Inc. (Suntek Information Systems, Inc.) (415) 657-0567	Arclan 100	MS-DOS, Advanced Netware 286, Vianet, Lanware	Coax	Baseband	No	Yes	Token-bus	255	2.5M	Token passing	2,000 ft	4 miles	4,000 ft	$299
Simplenet Systems, Inc. (714) 529-8850	Simplenet 3.0	Proprietary, Tapestry	Twisted-pair	Baseband	No	No	Distributed bus, peer-to-peer	128	3M	CSMA/CA	3,000 ft	—	3,000 ft	$399.95
Softnet Communication, Inc. (800) 533-1157	KAL 1000, Vianet LAN	Vianet	Coax	Baseband	No	No	Bus	255	2M	CSMA/CA/CD	1,200 ft	10,000+ ft	10,000+ ft	$295
Standard Microsystems Corp. (516) 273-3100	Arcnet	Vines, Netware, Tapestry, Waterloo	Coax, twisted-pair	Baseband	No	Yes	Distributed star, bus	255	2.5M	Token-ring	2,000 ft	4 miles	2,000 ft	$295
Tandy Corp. (817) 390-3700	Tandylink	Proprietary, Total Operating System	Twisted-pair	Baseband	No	No	Daisy chain	32	0.77M	CSMA/CA	500 or 1,000 ft	NA	1,000 ft	$119.95
Tangent Technologies (404) 662-0366	PC Macbridge ATB/II	Appletalk	Twisted-pair	Baseband	Yes	Yes	Bus	1,000+	230.4K	CSMA/CA	1,000 m	—	1,000 m	$250
	PC Macbridge ATB/MCA	Appletalk	Twisted-pair	Baseband	Yes	Yes	Bus	1,000+	230.4K	CSMA/CA	1,000 m	—	1,000 m	$300

COMPANY	PRODUCT	NETWORK OPERATING SYSTEMS SUPPORTED	CABLE TYPES SUPPORTED	BASEBAND OR BROADBAND	ON-BOARD COPROCESSOR	ON-BOARD MEMORY	WIRING TOPOLOGY	MAXIMUM NODES PER NETWORK	DATA RATE (BIT/SEC.)	ACCESS OR SIGNALING SCHEME	MAXIMUM LENGTH WITHOUT REPEATERS	MAXIMUM LENGTH WITH REPEATERS	MAXIMUM DISTANCE BETWEEN NODES	PRICE PER CARD
Telegence Corp. (818) 707-3200	3301 PC LAN Card	IBM, Netware, Torus	Twisted-pair	Broadband	Yes	Yes	Star, daisy chain	240	1M	Token passing	1,000 ft	6,000 ft	6,000 ft	$595
10 Net Communications (513) 433-2238	10 Net LAN	DOS environment, proprietary	Twisted-pair, fiber-optic	Baseband	No	No	Star, bus	30,000	1M	CSMA/CD	2,000 ft	10,000 ft	10,000 ft	$695
Texas Instruments, Inc. (800) 527-3500	Ethernet	Unix, DNOS, DOS	Ethernet, coax	Baseband	No	Yes	Bus	—	10M	CSMA/CD	—	—	—	$750-$3,180
Thomas-Conrad Corp. (512) 836-1935	Arc-Card	Arcnet, Netware, Vines, Tapestry, Waterloo Port	Coax	Baseband	No	Yes	Star	255	2.5M	Token passing	2,000 ft	20,000 ft	2,000 ft	$379
Tiara Computer Systems, Inc. (800) NET-IARA	Lancard/A-II	Netware, Vines	Coax	Baseband	No	Yes	Starburst	255	2.5M	Token passing	2,000 ft	20,000 ft	20,000 ft	$695
	Lancard/AHIZ	(See entry above)	Coax	Baseband	No	Yes	Starburst	255	2.5M	Token passing	400 or 1,000 ft	20,000 ft	20,000 ft	$425
	Lancard/AFO	Advanced Netware, proprietary, Arcnet-based environments	Fiber-optic	Baseband	No	Yes	Starburst	255	2.5M	Token passing	4,000 ft	40,000 ft	4,000 ft	$850
	Lancard/E	Any supporting Ethernet IEEE 802.3	Coax	Baseband	No	Yes	Ring	100	10M	CSMA/CD	1,640 ft	8,202 ft	500 m	$395
	Lancard/A	Arcnet-based environments, proprietary	Coax	Baseband	—	Yes	Starburst	255	2.5M	Token passing	2,000 ft	20,000 ft	20,000 ft	$350
TOPS (a Sun Microsystems, Inc. Company) (800) 222-TOPS	Flashcard	TOPS	Appletalk cable, twisted-pair	Baseband	No	No	Bus, star	32 or 254	0.23M or 0.77M	CSMA/CD	1,000 ft	3,000 ft	3,000 ft	$239
Ungerman-Bass, Inc. (408) 496-1011	NICPS/2	Net/One, Netware, PC LAN	Coax, Thinnet, CATV	Both	Yes	Yes	Star, tree, backbone with drops	Unltd	5M or 10M	CSMA/CD	200 m	Unltd	Unltd	From $495
	PC NIU	(See entry above)	Coax, Thinnet, CATV	Both	Yes	Yes	(See entry above)	Unltd	5M or 10M	CSMA/CD	200 m	Unltd	Unltd	$695-$1,345
	3270 NIUPC	(See entry above)	Coax, Thinnet, CATV	Both	Yes	Yes	(See entry above)	Unltd	5M or 10M	CSMA/CD	200 m	Unltd	Unltd	$995-$1,645
	NIUPC	Net/One, PC LAN, Netware, Tapestry	Coax, Thinnet, CATV	Both	Yes	Yes	Star, distributed star, tree, backbone with drops	—	5M or 10M	CSMA/ CD	200 m	Unltd	Unltd	$995-$1,645
	PC Network Interface Card	Net/One, Netware, PC LAN	Coax, Thinnet, CATV	Both	Yes	Yes	(See entry above)	Unltd	5M or 10M	CSMA/CD	200 m	Unltd	Unltd	$395-$1,045
	PC NIU Token-Ring	Net/One, Netware, PC LAN	Shielded, unshielded twisted-pair	Token-ring	Yes	Yes	Star, distributed star	Unltd	4M	Token passing	200 m	Unltd	Unltd	$695
	NIU-DMF32	Net/One	Coax, CATV	Both	Yes	Yes	Star, distributed star, tree, backbone with drops	Unltd	5M or 10M	CSMA/CD	200 m	Unltd	Unltd	Information not provided
Unisys Corp. (215) 542-2240	Usernet Squared	Netware	Twisted-pair	Broadband	No	No	Backbone with drops, distributed star	56; 270 ft	1M, 4M	CSMA/CD	4,000 ft	4,000 ft	2,000 ft	$199,$795
Wang Laboratories, Inc. (617) 459-5000	VS 802.3 LAN Connection	Wang Systems Networking, TCP/IP	Coax	Baseband	Yes	Yes	Bus	1,024	10M	CSMA/CD	1,640 ft	8,200 ft	8,200 ft	$1,500-$2,500
	802.3 Wangnet Service	(See entry above)	Coax	Broadband	Yes	Yes	Branching tree	1,024	10M	CSMA/CD	14,256 ft	14,256 ft	14,356 ft	$2,500-$3,800
Waterloo Microsystems (404) 441-1252	Network Interface Card/A	Waterloo Port, PC LAN Program	Coax, twisted-pair, fiber-optic	Baseband	No	No	Distributed star	255	2.5M	Arcnet	2,000 ft	22,000 ft	2,000 ft	$745
	Network Interface Card	(See entry above)	Coax, twisted-pair, fiber-optic	Baseband	No	No	Distributed star	255	2.5M	Arcnet	2,000 ft	22,000 ft	2,000 ft	$345
Wells American Corp. (803) 796-7800	A Star	Proprietary	Coax	Baseband	No	No	Linear bus	255	1.25M	Polling	1 km	1 km	1 km	$295
Wespac Business Systems Corp. (800) 247-5957	Syfanet	Proprietary	Coax	Broadband	Yes	Yes	Ring	255	10M+	CSMA/CA	10,000 ft	—	1,000 ft	Information not provided
Western Digital Corp. (714) 863-0102	WDLAN-SPR Starcard Plus	Netware, Vianet, Netbios-compatible, TCP/IP	Twisted-pair	NA	No	Yes	Star, bus	16,000	1M	CSMA/CD	800 ft	1+ miles	800 ft	$299
	WDLAN-SHP-Starlink Plus	(See entry above)	Twisted-pair	NA	No	Yes	Star, bus	16,000	1M	CSMA/CD	800 ft	1+ miles	800 ft	$374
	ND8003E Ethercard Plus	Kannet, Netware, Netbios, PC-LAN, MS-Net, Tapestry, TCP/IP	Thick, thin Ethernet	Baseband	No	Yes	Ethernet backbone with drops	9,900	10M	CSMA/CD	3,280 ft	8,200 ft	3,280 or 8,200 ft	$399
Xerox Corp. (800) TEAM-XRX	XNS on Ethernet	XNS	RG-58, thick Ethernet	Baseband	NA	NA	Backbone with drops	1,024	10M	CSMA/CD	626; 1,640 ft	1,820; 4,921 ft	2,150; 5,251 ft	Information not provided
	XNS on Synoptics Lattisnet	XNS	Fiber-optic Type A, Type B	Baseband	NA	NA	Star	1,024	10M	CSMA/CD	6,000 ft	12,793 ft	13,123 ft	Information not provided
Xyplex, Inc. (617) 371-1400	The Host Interface Unit	Ethernet, IEEE 802.3, TCP/IP	Coax, thin, twisted-pair Ethernet; RG-59 coax	Baseband	Yes	Yes	Bus	1,024	1M or 10M	CSMA/CD	1,640 ft	1½ miles	2½ m	$595-$2575
Zaki Corp. (617) 480-0201	PC Shareplus	Proprietary	Transistor-transistor logic	Transistor-transistor logic	No	Yes	Bus, star	9	Transistor-transistor logic	Transistor-transistor logic	230 ft	230 ft	460 ft	$825
Zenith Electronics Corp. (312) 699-2199	Z-LAN500	Netbios, Netware	Coax	Broadband	Yes	Yes	Branch, tree (virtual bus)	32M+	0.5M	CSMA/CD	5,000 ft	15,600 ft	15,600 ft	$695

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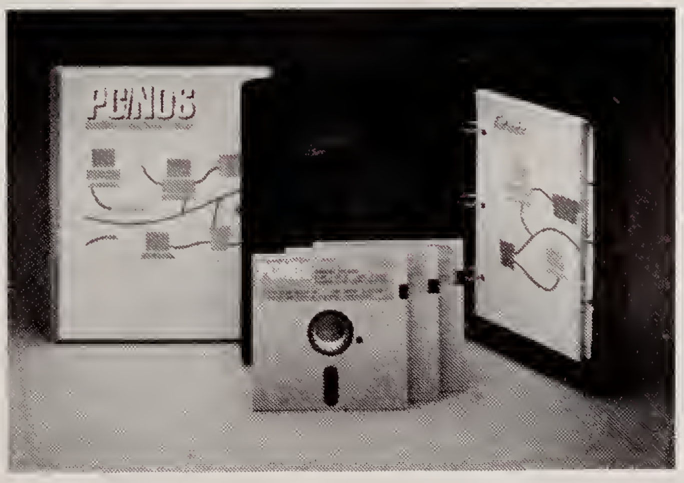

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SYSTEMS & PERIPHERALS

HARD TALK

James Connolly

DEC trying to go it alone

It's never been easy to be self-sufficient. Just ask any 22-year-old who works at an entry-level job while trying to pay for an apartment, a car and a college education.

So why should it be easy for a computer vendor to move into self-sufficiency?

The majority of computer vendors build their products by assembling or modifying components made by other companies; that modification can range from adding significant value to adding a label.

From the price and quality points of view, there is nothing wrong with going to an OEM. Outside sourcing allows the computer maker to concentrate on building CPUs and lets the peripherals makers focus on their own technologies. Few companies emulate IBM by designing most of their own products.

Controlling own fate

But one company that is trying to do that is DEC, which has been bringing its disk drive production in-house throughout the 1980s. It is a move that helps DEC control its own fate and its own profit, which could benefit users through lower prices and better quality control.

Like the college grad trying to pay the rent, DEC has not found the going smooth.

DEC's biggest disk-related headaches to date have stemmed

Continued on page 59

Convex, Alliant prep processors

BY STANLEY GIBSON
CW STAFF

Minisupercomputer rivals Alliant Computer Systems Corp. and Convex Computer Corp. plan to deliver their next-generation processors in late March, the companies said recently.

Convex said it will announce in February or March the C-2, which will triple the power of the vendor's C-1 machine and cost from $500,000 to $750,000.

"We've been expecting that product — in that time frame, in that price range," said Craig Mundie, Littleton, Mass.-based Alliant's vice-president of marketing. He said that in a few weeks, his firm will announce a comparable product. "We think we'll be competitive," Mundie said. Alliant has tentatively scheduled a press conference for Feb. 1, but spokesmen declined further comment.

Tom Lincus, an analyst with L. F. Rothschild & Co. in Boston, predicted Alliant will announce a high-end model comparable to the C-2 in price/performance.

Sanjiv Hingorani, vice-president of Salomon Brothers, Inc. in New York, speculated that the announcement will include compact versions of Alliant's four- and eight-CPU systems that offer more power at less cost than current models. Their power, Hingorani said, may be rated at double that of current Alliant machines, although he cautioned that performance for the Alliant and Convex processors in real applications might be lower than both companies' theoretical performance projections. Alliant's Mundie said version two of his firm's vectorizing, parallelizing C compiler, announced in October, will be out early this year.

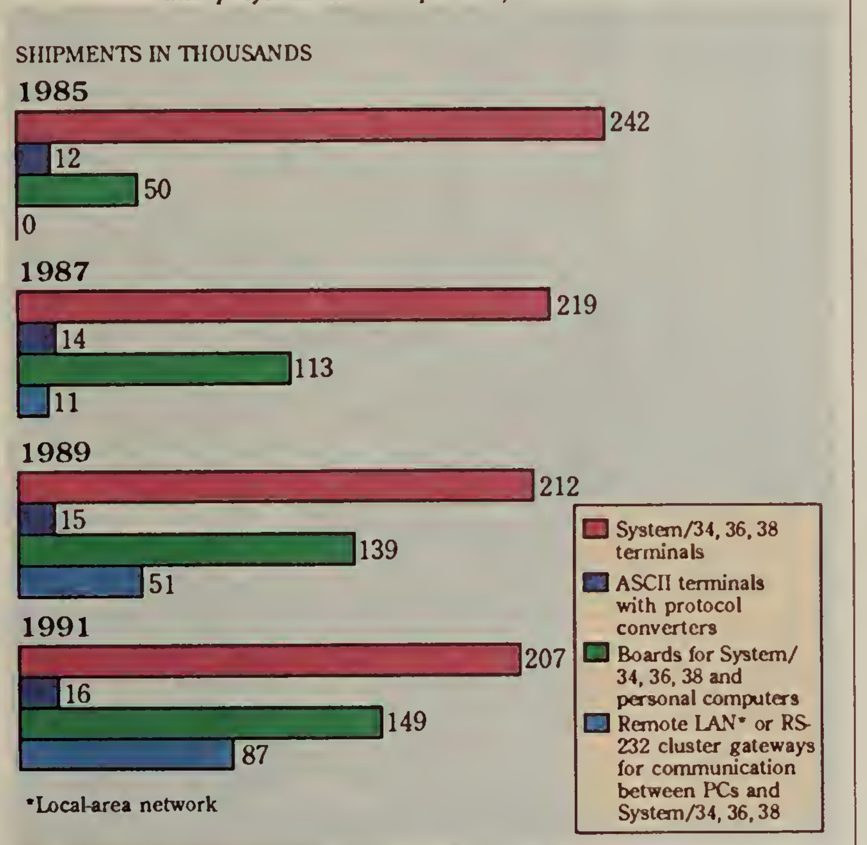
Convex, based in Richardson,

Continued on page 58

Data View

Trends in communications device preferences in IBM System/34, 36, 38 terminal environment

Terminals decline and terminal emulation products gain in actual and projected unit shipments, 1985 to 1991



INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHART

Gesme aims to tie IBM, users

Guide president seeks working relationship

BY STANLEY GIBSON
CW STAFF

Since his first Guide International Corp. meeting in 1970, Gary Gesme has attended 64 of 65 gatherings. Guide recently elected him president, seeing fit to overlook his less-than-perfect attendance record.

Gesme says a decade and a half of close association with the group of large IBM equipment users has given him a clear idea of what Guide can do best.

"We want to continue to work on the goal of Guide-IBM partnership," he says. The benefit of a working relationship with the industry giant is the influence that members can have over IBM's planning — causing IBM to turn out the products that are most useful to Guide members, he says.

Continued on page 58

Apollo hits 20 MIPS, firm says

Apollo Computer, Inc. will soon leapfrog rival Sun Microsystems, Inc. with a high-end system rated at 20 million instructions per second (MIPS), according to an independent research firm.

The firm, D. H. Brown Associates, Inc., recently published a report that outlines the specifications of the expected new high-end workstation from Apollo. The report said the system is based on a vastly different architecture than that of previous Apollo systems.

Apollo confirmed that it will release a so-called "desktop supercomputer" based on a proprietary reduced instruction set computing (RISC)-based CPU. "One of our next steps is to move into that high end to compete with Stellar and Ardent," a spokesman said.

Stellar Computer, Inc. and Ardent Computer Corp. are planning to introduce high-performance workstations in March. Stellar is headed by William Poduska, who launched Apollo [CW, Jan. 11].

The Apollo system will offer nearly five times the floating-point performance of Sun's Sun-4, according to D. H. Brown.

Continued on page 59

Inside

- Compugraphic, Autographix announce line of workstations for presentation graphics design and production. Page 60.
- Visual Technology offers DEC-compatible color terminal. Page 60.

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NETWORKING

Gesme

FROM PAGE 55

In addition, Gesme says he wants to structure Guide conferences to offer the greatest benefits to attendees — to give them an understanding of new technologies and the management skills to put them into practice.

Gesme, manager of systems programming at Deere & Co., Inc. in Moline, Ill., says Guide has helped him explore the leading edge in data processing, largely through presentations by and informal encounters with other members.

He says he is pleased that IBM has been sending progressively more important executives to address the group.

Seeks openness

At each meeting, Guide makes recommendations to IBM that the group calls requirements. One of the most consistently important requirements has been greater openness by IBM in explaining its plans. Gesme has seen progress to the point where IBM can walk the fine line separating preannouncements and statements of direction.

Although it is difficult to determine whether the prodding of Guide is the cause, two recurrent requirements are now being addressed by IBM. In recent years, members cried out for "solutions, not necessarily products," according to Gesme. In July 1987, IBM announced the Applications Systems Division, the goal of which is to provide a wide selection of applications in a timely manner.

Connectivity between IBM architectures has also been at the top of the user wish list. Last spring, IBM announced its intent to create portability of software across IBM hardware families through its Systems Application Architecture product.

Among the technologies generating wide interest is IBM's DB2. "The move to DB2 is like the move from assembler to Cobol much earlier. It costs more, but it's easier to write. It is also easier to support and maintain," Gesme says.

However, the move to DB2 requires adaptations. Greater memory is required to lower response times, which are often still too slow in DB2. "The end user puts in a query and doesn't know when it will come back. We want to see a three-second response time. Thirty seconds is unacceptable," Gesme says. "With IMS, the transaction time is predictable. DB2 may have a very different response time. We have to work with the users so they understand this."

Most Guide members are users of the 3090 series and interest in enhancements to that line is usually high. According to Gesme, members are content with IBM's handling of its flagship computers, which includes a commitment to 15% improvements in price/performance.

Although equipment maintenance has been in the headlines in the past year, spurred by IBM's Corporate Service Amendment discount program, Gesme says interest on the part of Guide members in maintenance has been lukewarm.

"The maintenance topic has become uninteresting over the last five years. This is because equipment has become much more reliable. Now, nobody shows up for the maintenance meeting," he says.

Processors

FROM PAGE 55

Texas, has indicated for some time that a new machine was coming but had previously not released details. Recently, the *Dallas-Fort Worth Business Journal* reported performance, price and delivery specifics.

A Convex spokesman confirmed most of the facts that appeared in the journal article but said the machine will offer three times the power of current machines rather than twice the power, as reported.

Depending on the Fortran version used, Convex's C-1 XP is capable of 8.7 million to 15 million floating-point operations per second (MFLOPS), according to International Data Corp. (IDC) in Framingham, Mass. Alliant's FX/8 can perform 8.5 to 27 MFLOPS, depending on Fortran version and compiler, IDC said.

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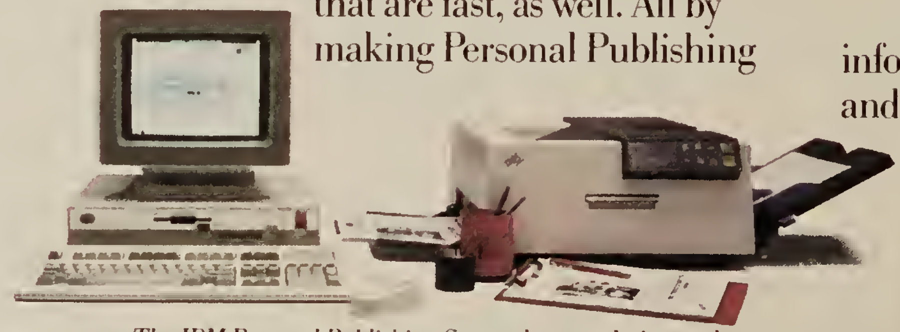

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THE COMPANY NEWSLETTER

All-Stars Clinch Division Title

Heavy hitting powers All-Stars to the top

Last night, the All-Stars won the game, the title and a chance to shuffle off to Buffalo next week for the championships.

The All-Stars powered themselves to the top with a 9-5 victory over the Grass Stains, who had been tied with the All-Stars for first place. The game was tight until the bottom of the fourth when the All-Stars blasted into the lead with two home runs to the upper deck in left field.

The game was highlighted by a most improbable play in which three All-Star players, each running at different speeds, ended up on third base at the same time. Fortunately, the third baseman missed the throw from centerfield, allowing two of the runners to score.

But Gesme says he will not lose sight of Guide's responsibility to make members better at their jobs, particularly by developing skills used in senior management. If Guide can make attendees more effective employees when they return to work, it will convince employers of the value of the organization and go far to ensure Guide's future, Gesme maintains.

Apollo

FROM PAGE 55

The Sun-4, introduced in mid-1987, is Sun's RISC-based system and reportedly has a 10-MIPS rating. It was also rated at 1.1 million floating-point operations per second (MFLOPS) in a performance test.

A base configuration of the Apollo workstation will have 8M bytes of memory, 154M bytes of storage, a 19-in. monitor with 1,280- by 1,024-pixel resolution and a 16-bit Z buffer, according to D. H. Brown, which claimed an entry-level system will be priced at less than $40,000.

An Apollo customer who was briefed on the system and requested anonymity called D. H. Brown's specifications realistic.

Apollo would not confirm any of D. H. Brown's specifications, but a spokesman said the workstation will have a new microprocessor as well as a new I/O structure, bus and controllers.

The workstation, expected by industry observers since the Sun-4 announcement, is a major departure for Apollo, which has long depended on Motorola, Inc. 68000 microprocessors.

Connolly

FROM PAGE 55

from various reliability complaints a couple of years ago relating to its RA81 high-end 14-in. drive.

More recently, another disk drive problem appeared when DEC's Microvax 3500 was delayed by the apparent failure of the RA70 disk drive to meet specifications. DEC stated that "quality qualification of the RA70 took longer than expected" but that there were no current problems with the DEC-built drive.

Oops

In the wake of what might be considered an "oops" with the RA70, DEC will have to be extra careful to make sure the drive works as promised at user sites. The company also will have to ensure that if problems do arise, they are handled in an honest and efficient manner — not stonewalled.

Plenty of eyes are now on DEC's storage strategy. The RA81 drew attention, and some users in the transaction-oriented commercial sectors, which DEC is targeting, have questioned whether the company will be able to provide the disk throughput and capacity that they need.

In the coming months — when the RA70 ships, and DEC is rumored to be preparing for a high-end disk drive announcement — users may receive answers to some of the questions about DEC's grow-it-at-home approach.

Connolly is *Computerworld's* senior editor, systems & peripherals.

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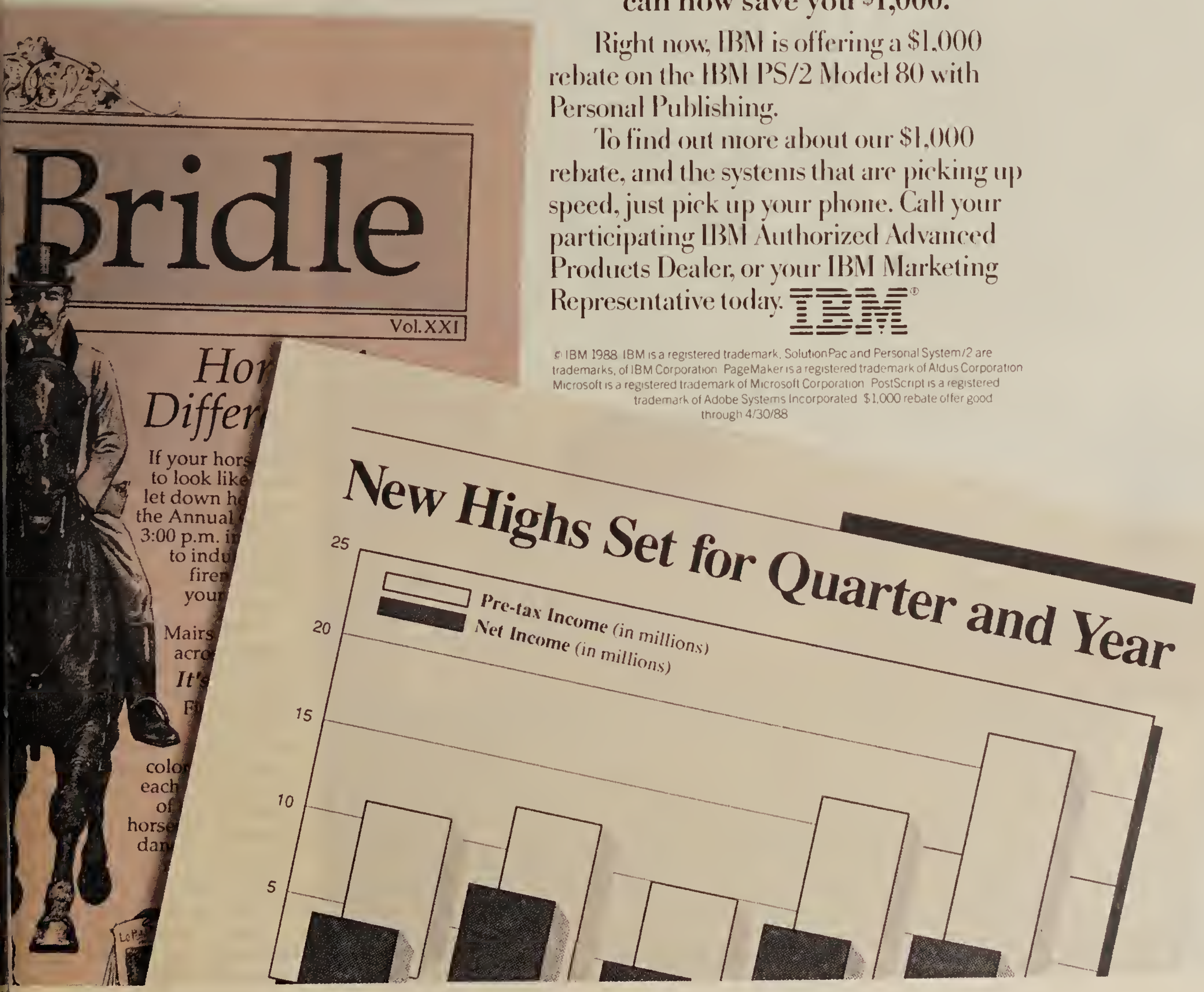

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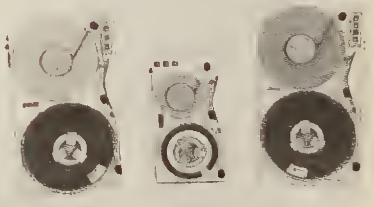

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NEW PRODUCTS

Processors

Nixdorf Computer Corp. has announced the **Targon System 35/50** in both single- and dual-processor versions.

The Unix-based system incorporates reduced instruction set computing. With a single processor, the Targon System 35/50 runs at 6.5 million instructions per second (MIPS); with dual processors, it runs at 11.7 MIPS. A floating-point accelerator is standard. Random-access memory ranges from 4M to 64M bytes.

Nixdorf also announced a line of software tools for the Targon series, including a relational data base, T/Reflex; an expert system environment called Twaice; and an applications generation tool called Targon E.

A basic Targon System 35/50 costs from $125,000.

Nixdorf, 80 Main St., North Reading, Mass. 01864. 617-664-5781.

Graphics systems

A line of three workstations for presentation graphics design and production has been announced by **Compugraphic Corp.** and **Autographix, Inc.**

Called the **Designer Series** by Autographix and offered as part of Compugraphic's **Presentation Series**, the workstations range from the entry-level AGX System 1, priced at $29,850, to the Intel Corp. 80386-based AGX System 3, priced at $47,850. The mid-range AGX System 2, priced at $38,850, offers the same graphics system controller as the System 3.

All three systems include Autographix Release 6.0 software featuring more than 100 Compugraphic fonts, a minimum of 256 colors per image and such charting and graphics features as scatter diagrams, automatic builds for word slides and global editing.

Autographix, P.O. Box 9031, Waltham, Mass. 02154. 617-890-8558.

Data storage

A series of 5¼-in. full-height Winchester disk drives has been announced by **Micropolis Corp.**

The **1560/1580** series is said to offer storage capacities to 765M bytes. Data is transferred at a 15-MHz data rate, and users can choose either the enhanced small disk interface (ESDI) or synchronous small computer systems interface (SCSI). Average seek time is 16 msec.

Micropolis also announced a half-height 5¼-in. Winchester disk drive with capacities from 85M to 182M bytes. The 1650/1670 series offers a 16-msec access time. Both ESDI and SCSI versions are available.

The 1560/1580 series costs $2,295 for ESDI and $2,395 for SCSI in 2,000-lot quantities. The 1650/1670 series costs $1,095 for ESDI and $1,165 for SCSI in 1,000-lot quantities.

Micropolis, 21123 Nordhoff St., Chatsworth, Calif. 91311. 818-709-3305.

Terminals

Visual Technology, Inc. has expanded the capabilities of its **Visual 241** color terminal to include full Digital Equipment Corp. VT241 and VT340 compatibility.

The Visual 241 also offers a choice of 16 simultaneous colors from a palette of 64. Other features include integrated bit-mapped color graphics and alphanumeric text, support for the Tektronix, Inc. 4010 and 4014 graphics protocol and DEC Regis emulation.

Visual Technology also expanded its **Visual 600** line with a DEC VT220-compatible video display terminal. The Visual 630's processing capabilities include the execution of down-line-loaded applications at the display terminal level and the ability to locally configure a random-access memory disk for local applications processing.

The Visual 241 costs $1,895. The 600 line costs from $695.

Visual Technology, 1703 Middlesex St., Lowell, Mass. 01851. 617-459-4903.

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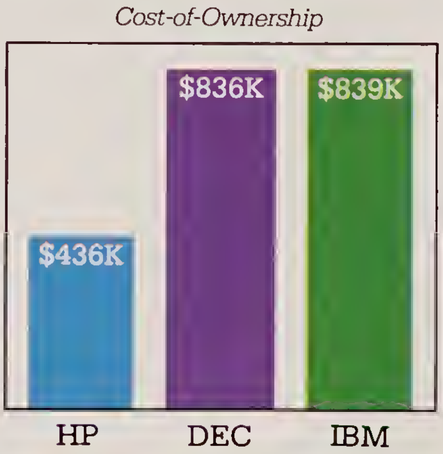

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RISC—Reduced Instruction Set Computing—is a new concept in designing computers which, through simplification, can speed up computer processing.

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We know you want more networking options, not less.

Hence the HP commitment to a networking strategy that gives you the true multi-vendor connectivity that proprietary networks simply can't deliver.

HP AdvanceNet.

A strategy which adheres to industry standards.

And which supports de facto standards such as SNA.

For example, HP AdvanceNet is based on the OSI seven-layer model. Our HP StarLAN office networking is based on IEEE 802.3. And our X.25 Private Wide Area Network is based on CCITT standards.

It's this commitment to true multi-vendor networking that will allow you to keep your networking options open in the future, and will protect your existing systems investment.

It's a long-standing commitment.

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From planning through maintenance. With proven services designed expressly for your multi-vendor network.

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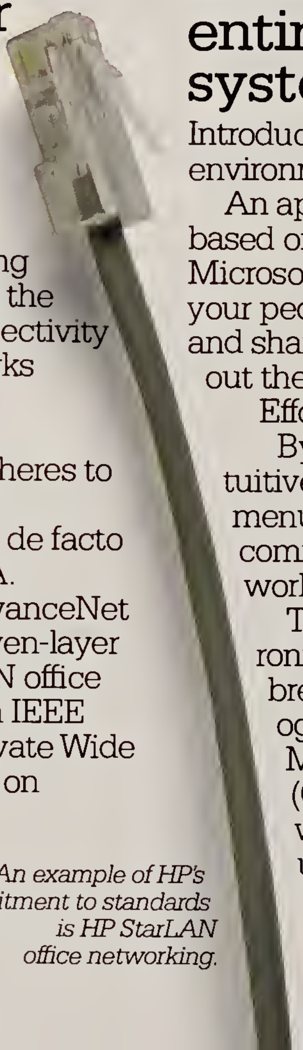

An example of HP's commitment to standards is HP StarLAN office networking.

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Introducing the HP NewWave environment.

An application environment based on MS™-DOS and Microsoft® Windows 2.0 that lets your people access, manipulate and share information throughout the system.

Effortlessly.

By means of simple, intuitive icons. Pull-down menus. A "mouse." And a common interface across workstation applications.

The NewWave environment incorporates two breakthrough technologies, the HP Object-Management Facility (OMF), and "agents," which together allow users to focus on their business tasks, not their computing tools.

OMF enables users to combine and manip-

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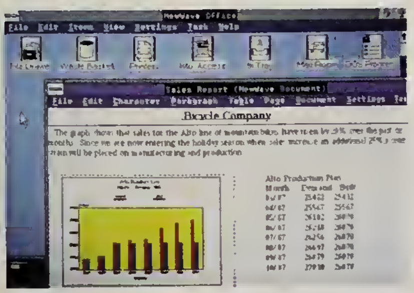
wlett-Packard partner?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HP integrated workstations with the NewWave environment.

What's more, "agents," which are practical implementations of artificial intelligence principles, can learn and perform repetitive tasks for your users. For example, "agents" can automatically update and distribute a sales report. On a prescribed day, at a certain time.

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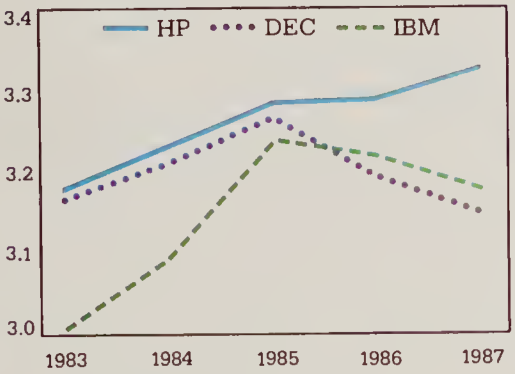

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IN DEPTH

Why the Mac will win

Could Apple beat IBM in corporate microcomputing or does 'winning' just mean staying in the ring?

PRO

BY CONRAD BLICKENSTORFER

When the cute little Macintosh first knocked on the door more than three years ago, no one took it seriously. Then it reappeared as the Apple Computer, Inc. Macintosh Plus, bringing Adobe Systems, Inc.'s Postscript and the wonderful world of desktop publishing with it. And corporate America began to notice.

Now, in its third incarnation, the Macintosh may actually blow the IBM Personal Computer's house down and, within the next few years, become the U.S.'s business standard of choice.

Look at all the enthusiasm surrounding Macintosh products and compare it with the frustrated waiting in the DOS world. Look at the Mac technology that performs extraordinary tasks — without the fanfare and drama we've learned to tolerate from IBM and its "me-too" vendors.

How did it happen? Can the Macintosh really seize the whole micro pie and replace PCs and PC clones? Its chances are good.

The PC world is in a state of disarray. The introduction of IBM's Personal System/2 has created a lot of confusion. The machines are clearly superior to their predecessors, offering significant innovations such as IBM's impressive Micro Channel architecture and surface-mount technology. Predictably, demand has risen in recent months, and it appears there are now long waiting lists for some models in IBM's lineup.

Nevertheless, with its approach of equipping the machines with the whole range of Intel Corp. chips and other assorted features, IBM has overwhelmed rather than reassured potential buyers.

Those who had hoped for a new generation of PCs based on the 80386 chip were disappointed. The bread-and-butter machines in the PS/2 lineup — Models 50 and 60 — use the older 80286 chip.

And after three years of unfulfilled promises and speedy but unexciting service in the IBM Personal Computer AT, that chip has left some end users disappointed and cynical.

The AT never did live up to its promise and was discontinued by IBM without ever getting a

Continued on next page

Blickenstorfer is director of data processing and analysis for the Dormitory Authority of the State of New York in Delmar, N.Y.

CON

BY JOHN XENAKIS

Can anyone really believe that Apple Computer, Inc. is somehow going to put IBM out of business in the microcomputer department? I just don't think it's going to happen.

But OK, let's suppose it does. So then, is Apple also going to put Compaq Computer Corp. out of business? What about AT&T Information Systems? How about ITT? And Hewlett-Packard Co.? What about Tandy Corp. and the hundreds of other clone makers?

Get real — there are elemental forces of nature going on here. This isn't Apple vs. IBM. This is Apple vs. the rest of the world. Apple isn't going to win that battle no matter how good the Macintosh user interface is. The reason the Mac is not going to become the industry-standard business computer is because Apple doesn't believe it can.

The best way to explain is through an anecdote. In 1985, I received a review copy of Version 1.0 of Digital Research, Inc.'s Graphics Environment Manager (GEM). At that time, GEM was a new graphical interface intended for Microsoft Corp. MS-DOS machines that replaced line-oriented commands with a more intuitive user interface.

When I brought GEM up on my IBM Personal Computer, I couldn't believe my eyes: All of a sudden, my PC looked exactly like a Macintosh. It had the same icons and pull-down menus.

About a month later, I was shocked to hear that Digital Research was coming out with an updated version of GEM that would make it look a little different. The reason for the change? Apple had sued Digital Research for copyright infringement.

I was shocked. I thought this was one of the dumbest things Apple could have done. Let's look at the alternative. Suppose instead of suing Digital Research, Apple had issued a press release saying, "We're delighted that Digital Research has adopted the Apple user interface, and we call on IBM, Microsoft and other industry leaders to form a standards committee so that all users of all microcomputers will

Continued on page 64

Xenakis is an independent consultant in Framingham, Mass., and software editor of *Computer Update* magazine, published by the Boston Computer Society. He is also a commentator on the weekly "World of Computers" radio show on WDLW, a Boston-based station.

WARREN GEBERT

- **PC world in disarray**
- **High-priced PS/2 models**
- **Ongoing battle over user interfaces**

Pro

FROM PREVIOUS PAGE

mainstream operating system to exploit the much-touted potential of its protected mode. Most IBM buyers will end up with 80286-equipped models of the PS/2 series, forced to live with all the limitations of that chip.

With the pricing of the PS/2 Model 80, IBM is clearly indicating that, in its opinion, the 80386 machines represent top-of-the-line professional workstations rather than replacements for the ubiquitous IBM PC. This is a major disappointment. It is very unlikely that the 80286 will ever be able to fulfill the promise and expectation of what a truly useful business workstation should be.

> ARE WE REALLY expecting hordes of customers to suddenly pack their PCs with megabytes of memory, buy a high-resolution screen and an entirely new set of programs just so they can use a mouse and have Lotus in the background while they work on their word processors?

To complicate matters further, the PS/2 Model 30 is equipped with an old-fashioned 8086 chip. Buyers did not flock to this model the way IBM had hoped, but enough of those machines will find their way onto enough secretaries' desks to keep the cash registers of software firms ringing for a long time.

To make things even more complicated, manufacturers that have been making a living by producing IBM-compatible computers will not be able to clone IBM's new circuitry for a while. They are now trying to turn their handicap into a virtue by proclaiming the older standard as the real one. Some, most notably Compaq Computer Corp., have been successful.

But this internal war in the PC world certainly has made PC buying decisions more awkward.

Hot-rodders

In the short term, the most serious problem in the PC world is plain to see: The operating systems for the 80286 and 80386 chips are too new to be of much use. The machines, though chock-full of MIPS, or million instructions per second, are reduced to being hot-rod PCs.

While it's fun to make Lotus Development Corp.'s 1-2-3 run ever faster, it's not always worth the higher cost of those machines. Also, many customers resent it when every release of the same old software packages grows fatter and more sluggish than the previous one. Users require a more powerful machine just to maintain former levels of performance.

All in all, the current situation is like having a V-8 engine strapped into a motorcycle: plenty of power but rather useless and crash-prone.

Of course, there is Microsoft Windows and the much ballyhooed OS/2 operating system. I have tried Windows, and just as I immediately loved the Macintosh environment with its crisp graphics and effortless, snappy response, I immediately disliked Windows. I felt constrained by its sluggish handling and rigid user interface.

Perhaps I still harbor a grudge from the IBM Topview fiasco, or maybe I'm jaded after years of waiting for Windows, which was going to be available "real soon" every time I inquired. But it just doesn't seem as though the PC can handle a graphics environment very well.

OS/2 may or may not have a lot of potential. But I can't see how everyone will suddenly switch to an expensive new operating environment. The migration from IBM's PC-DOS Version 1.1 to 2.0 was painful enough for many users, but it is nothing like the switch from Version 3 to OS/2 promises to be. Are we really expecting hordes of customers to suddenly pack their PCs with megabytes of memory, buy a high-resolution screen and an entirely new set of programs just so they can use a mouse and have Lotus in the background while they work on their word processors? It's been argued that the switch will be easy once 4M- or 8M-byte configurations are standard. But I'm not sure this will happen overnight.

Software savior

One thing that may rescue the sinking PC ship and convert buyers in droves is the appearance of a truly new and sensational program — something like Lotus's Visicalc or 1-2-3. The PC needs a program that will appear out of nowhere and take the world by storm.

But the 80286 has been around for some time, and that kind of miracle hasn't happened yet. Perhaps it's true that the 286 and 386 chips are too complicated. The good old days when one crackerjack programmer could single-handedly produce a hit program may be gone forever.

Another PC roadblock — the problem with the frustrating 640K-byte barrier inherent to all 8088 machines — seems incredibly hard to overcome. There are, of course, several standards that allow these machines to get past 640K bytes, sort of, with bank-switching techniques. But they are little more than Band-Aids.

These quick fixes remind me of the days when you overheated monster Apple IIs equipped with lots of extra random-access memory, which required preboot

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disks to allow oversized Visicalc spreadsheets. Current bank-switching is essentially the same thing, and it won't last.

Proper access to the protected mode of the 286 and 386 chips requires a new operating system, complete with application software — which brings us back to OS/2 and all its drawbacks.

Out of the race

As if these problems aren't bad enough, the DOS world has another millstone around its neck: The U.S. is already populated with millions of older 8088 and 8086 machines that will never be able to participate in this brave new world of OS/2.

These machines will not just be thrown away because there's a large number of perfectly adequate business software programs that will not lose their basic usefulness for years.

Witness the fact that 1-2-3 has been around in virtually unchanged form for more than five years. The program already offers far more features than 95% of its users will ever need, and it appears highly unlikely that anything will replace it soon.

> IT IS NOT hard to see why PC software has a steep learning curve. With the Mac, once you know how to handle one program, you know them all.

Since businesses will not just write off millions of machines, the world of IBM PCs will effectively split into old and new. Planned obsolescence and innovation may eventually convert more and more users to the new standard. But IBM's decision to reserve the 80386 for its top-of-the-line machine probably typecast the chip for some time to come as an engine for superusers elite.

Compare this with the Macintosh.

The Mac is not hampered by millions of older machines and programs. It rose almost effortlessly from a diminutive 128K bytes of RAM to 4M bytes and more. There are no insurmountable barriers, no switches, no adjustments.

More memory? Fine. Finder can handle it. Operating system problems? No sweat. Apple will quietly introduce a new version of Finder, and all you'll have to do is go to an Apple dealer and pick it up for free. Then there is the amazingly stubborn personality of Finder. True, Apple's operating system with the funny name was once slow and cumbersome, and many wondered how someone as brilliant as Steve Jobs could be so shortsighted as to limit users to one disk drive, not enough memory, a small screen, no hierarchical file system and so on.

Yet Finder — with its icons and pop-up windows, its trash cans and handlebars — works. It took on a lot of muscle and speed in the past few years, but it never changed its fundamental nature and appearance.

And there is something oddly appealing about a machine that cries uncle, displays a bomb instead of an error message and shuts itself down rather than reveal its innards. Compare that with Unix. You could say Finder is the ideal operating system for the business world: You never have to worry about what goes on inside.

Natural artist

Furthermore, graphics on the Macintosh are simply superior to the PC. The cursor moves more freely and effortlessly, and it provides the end user with the feeling of being directly connected to the Mac.

One gets the clear impression that this machine was engineered for use with a mouse, while the IBM PC still is not. The screen, because it is smaller, is cool, crisp and easy on the eye. The PC world has been playing catch-up for years now. Alas, those efforts have been met with little success, despite an impressive array of add-on boards, high-resolution screens, mice, accelerators and other goodies.

It seems PCs need a lot more hardware and horsepower to even come close to the graphical performance of the Macintosh. Even when they do come close, it always looks as if they're trying to be something they're not. Also, compare the painless installation of just about any Mac program with the cumbersome process of getting PC software loaded and configured. The Macintosh is a natural.

Another major reason that the Mac is the encroaching force in corporations is the common user interface of every Macintosh application. It's head and shoulders above the PC world, where virtually every package has a different set of commands and a different mode of operation.

Absurdly, PC software companies even sue each other for using the "look and feel" of a competitor's program instead of working with each other and helping their users.

In such a climate, it is not hard to see why PC software has a steep learning curve. With the Macintosh, once you know how to handle one program, you know them all. This is not to say that Mac programs are user-friendly across the board. Some are not, especially once you get into the more esoteric functions in which a click of the mouse won't do. But the user will always feel at home with functions such as saving, editing, printing and the opening and closing of files.

On top of that, the cut-and-paste functions are identical in all Macintosh programs, and the familiar clipboard is always there. It is a breeze to move almost anything from one Mac program to another. This is invaluable and still cannot be done easily on PCs.

The final tally

The PC world used to be exciting, but look at where the great innovations have been in recent years: While PCs have suffered through a multitude of minor revisions to the same old programs, the Mac world has seen major breakthroughs:

- The Postscript-driven Laserwriter, which changed printing forever and gave it an entirely new meaning.
- Aldus Corp.'s Pagemaker, which created the field of desktop publishing.
- Microsoft Excel, the ultimate spreadsheet.
- The first really useful 19-in. super-high-resolution screens, which can display two full pages of text.
- A new breed of useful, document-oriented word processors and many other dazzling software innovations.

On top of that, Macintoshes are now communicating with Digital Equipment Corp. minicomputers and Sun Microsystems, Inc. supermicros, using connectivity programs such as Pacer, Inc.'s PClink package.

After passing on Apple's Lisa and first being skeptical about "the computer for the rest of us," corporations appear to

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*Shell Programming	February 1-2 March 7-8 April 11-12 May 16-17 June 20-21 August 1-2 September 12-13 October 17-18 November 28-29	January 25-26 April 4-5 June 20-21 August 29-30 October 10-11	February 8-9 April 18-19 July 11-12 September 12-13 October 24-25	$390
*Using Advanced UNIX System Commands	February 3-5 March 9-11 April 13-15 May 18-20 June 22-24 August 3-5 September 14-16 October 19-21 November 30-December 2	January 27-29 April 6-8 June 22-24 August 31-September 2 October 12-14	February 10-12 April 20-22 July 13-15 September 14-16 October 26-28	$585
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*UNIX System Administration	January 19-21 February 23-25 March 29-31 May 3-5 May 31-June 2 July 19-21 August 23-25 October 4-6 November 8-10	February 9-11 April 19-21 July 12-14 September 13-15 October 25-27	February 9-11 May 3-5 July 26-28 September 20-22 November 8-10	$585
*'C' Language Programming	January 11-15 February 8-12 March 21-25 April 25-29 May 23-27 July 11-15 August 15-19 September 26-30 October 31-November 4 December 12-16	February 22-26 May 2-6 July 25-29 September 26-30 November 7-11	February 29-March 4 May 16-20 August 8-12 October 3-7 November 21-25	$975
*Advanced 'C' Programming Workshop	January 4-5 February 8-9 March 14-15 April 18-19 June 6-7 June 27-28 August 8-9 September 19-20 October 24-25 December 5-6	February 15-16 April 25-26 July 18-19 September 19-20 October 31-November 1	February 22-23 May 9-10 August 1-2 September 26-27 November 14-15	$390
*Advanced 'C' Programming under UNIX	January 6-8 February 10-12 March 16-18 April 20-22 June 8-10 June 29-July 1 August 10-12 September 21-23 October 26-28 December 7-9	February 17-19 April 27-29 July 20-22 September 21-23 November 2-4	February 24-26 May 11-13 August 3-5 September 28-30 November 16-18	$585
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have changed their minds about the Macintosh. Once considered merely cute, the Mac has now firmly established a foothold in most companies. Long lines form for Macintosh workstations as more and more people discover what the machines can do.

The first few Macintoshes were purchased by corporations for experimentation with desktop publishing or Excel. Now, with the advent of the Macintosh SE and Macintosh II, MIS departments are inundated with user requests for more Macintoshes instead of more PCs. The formerly sound strategy of buying PCs as regular workstations and limiting the Mac to special duty is starting to crumble.

A hybrid Mac-and-PC environment may be somewhat difficult to manage now, but this may soon change. There are already reports of programs that let machines based on Motorola, Inc.'s 68020 chip emulate the 80286 instruction set in software and still run faster than a stock PC AT.

Companies with local-area networks or a central minicomputer or mainframe may not even have to go that far. Many popular PC software packages have superior Macintosh equivalents that read PC data files without any conversion. Emerging standards such as Sun's Network File System will make it even easier to communicate among different environments.

WHY NOT switch to the Mac?

In a company in which all workstations are on a LAN or connected to a mini, there is no reason for all micros to be the same. As long as the machines can communicate with each other and data can easily be moved, then why not switch to a superior and more innovative technology? Why not use a technology that has all the answers now, not sometime in the distant future?

In other words, why not switch to the Mac?

PCs would not lose in the sense that they would disappear; rather, they would simply recede and become a more or less stagnating culture with little innovation, a world in which several incompatible levels of performance compete internally and in which fewer and fewer users are willing to keep up with vaporware, multiple standards and planned obsolescence.

Meanwhile, the Macintosh may win the race and become the machine of choice in many of the U.S.'s largest corporations. As director of data processing in a large multivendor environment that includes an increasing number of Macintoshes, I am looking forward to it. •

Con

FROM PAGE 61

benefit from this interface."

Apple could then have led an industry drive to develop a common user interface that would have been used by both the Macintosh and the MS-DOS worlds. The company's position in the industry would then have been far more prestigious and influential.

Instead, Apple followed a strategy that says this: Think of the Macintosh market as a pie. We're going to keep that pie all to ourselves, even if it means severely restricting its size. This is ours, and you can't have it.

It's hard to believe, but only a little more than a year ago, it was still impossible for any board manufacturer to sell an expansion board for a Mac. Apple simply didn't permit it. We can now see that its new policy of permitting third-party expansion boards to be manufactured has done the Macintosh an enormous amount of good.

Unlearned lessons

It's just a shame that Apple didn't learn more from that lesson. Its vaunted new open architecture policy covers only a small portion of the meaning of that term in the PC world. If Apple really wanted to see the Mac win, it would open the door to clone makers.

If it did, we might see a real chance of the Macintosh architecture taking over the PC architecture.

I've told you an anecdote about Apple. Now let me repeat

It's one thing to fill a document with data, another to fill it with content that makes someone take action. The document that best persuades not only has a typeset appearance, with visual as well as typographic elements, but also has superior content—facts and figures drawn from all possible sources to make a point of view, a point of sale.

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an anecdote about IBM to illustrate the difference between the two companies.

When IBM was designing the Personal System/2 in 1985, it wrote a proposal for the user interface. The company could have developed it internally, copyrighted it and prevented any clone maker from copying it. That's essentially what Apple did on the Mac.

Instead, IBM negotiated with Microsoft for the latter company to modify Microsoft Windows to conform to IBM's Common User Access (CUA) interface for its micros, minis and mainframes. The result is Presentation Manager, which is to be bundled with OS/2 later this year. Every clone maker that uses OS/2, therefore, will be running with IBM's user interface.

How different this is from the Macintosh situation. Instead of keeping its user interface to itself, IBM took a series of business steps that made its user interface available to every vendor in the industry.

This is consistent with what seems to be IBM's policy of being as open as the company considers possible. From Day 1 with the IBM PC, any clone maker could come out with its own computer with the same "look and feel" as the IBM computer.

How different can the marketing philosophies of these two companies be?

IBM's philosophy is that the PC world is a very, very big pie. It is apparently willing to allow as many companies that want to to share in that pie. IBM sees the pie growing larger and larger — so large that even if IBM gets only a small chunk of it, that chunk will be larger than the whole pie in a world where the PC is closed, or partially closed, to other vendors.

What IBM understands, and Apple doesn't, is that clone makers like Compaq help IBM's strategy far more than they hurt it. IBM is looking forward to a time in the 1990s when all of its micro, mini and mainframe computers share common interfaces that have become industry standards and that other companies will be rushing to copy.

> WHAT IBM understands, and Apple doesn't, is that clone makers help IBM's strategy far more than they hurt it.

Imagine a world in which a company similar to Compaq made Macintosh clones. What a different world it would be.

The good news

Now let me step back a minute and talk about a couple of things I like about the Mac.

The Macintosh has created enormous excitement in the industry. Its user interface has generated innumerable innovations in software that are going to affect us all for years to come.

One software package after another developed for the Macintosh has been unique — not because of its functions but because of the way the end user invokes those functions. The imagination of Macintosh software developers has been challenged over and over again to make complex software packages easily accessible to the nontechnical end user.

There are many examples of this, but perhaps none is more stunning than the release of Hypercard. Apple bundled Hypercard at no cost with all new Macintoshes and made it available for just $49 to existing Mac owners. Thus, Apple has practically guaranteed that within a year or two almost every Macintosh owner will have Hypercard.

What makes this particularly notable is that Hypercard is a well-structured computer programming language for nontechnical end users. The existing popular end-user programming languages — Basic and spreadsheet macros — are considered unbearably sloppy and unstructured by computer scientists.

Nothing illustrates better how exciting Hypercard is than the number of stackware programs coming into the market; that is, programs developed for the Macintosh using Hypercard as a development language.

This is only one example of

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...not tossed out.

the many favorable things about the Mac. What makes me angry is that Apple has squandered and is continuing to squander all this creativity by keeping the entire Macintosh market to itself, thereby restricting the size of the market and creating less incentive for third-party software developers to invest in the Mac.

Drawbacks

I understand that some MIS directors have installed quite a few Macintoshes in their organizations and are continuing to install more. Presumably, one argument they use with upper management to justify this decision is that they think it unwise to lock themselves into a single vendor — IBM.

Well then, why are they locking themselves into Apple?

The fact is, users could buy a PS/2 today and replace it tomorrow with a machine from any of a hundred other manufacturers. But each time they buy a Macintosh, they lock themselves tighter into Apple. If these managers don't understand this concept, many other MIS managers do, and that's why the Mac will never do more than make a dent in the overall microcomputer marketplace, let alone take it over completely.

For example, Apple is now coming out with a multitasking operating system called Multifinder. According to Apple and Apple watchers, this version of Multifinder is only a first step in the development of a multitasking operating system. For all the complaints we've heard about OS/2's lateness, at least it has all the multitasking power that users of mini and mainframe computers have come to expect. It also has the OS/2 LAN Manager, a very important component sorely lacking from the Macintosh's repertoire.

Apple is reportedly hiring hundreds of programmers to beef up its operating system software. What if Apple missteps and further major enhancements are delayed a year or two, as frequently happens to large companies when they hire lots of programmers too quickly? Then the Macintosh fanatics will be left with lots of nice computers that do lots of nice things but do not take advantage of the latest technology.

During the Vietnam War era, some wag suggested the U.S. declare we had won the war and then go home. Well, Apple could say today that it has won the war, and in that sense, any pronouncements about the demise of MS-DOS are correct.

The fact is, Apple has won the battle of the user interface. The new IBM and Microsoft Presentation Manager will have a user interface that looks very much like the Macintosh interface. Thus we see that the PC architecture has moved strongly in the direction of the Mac architecture.

On the other hand, Apple has also been moving more and more in the direction of the PC architecture, albeit very reluctantly. A major part of the Macintosh's increasing corporate acceptance is that it can coexist a lot better with the PC world. The Mac has better network support for communicating with PCs and even has a "DOS compatibility window," in which you can run PC-compatible programs with the right hardware.

> APPLE has squandered [its] creativity by keeping the entire Mac market to itself.

This is particularly ironic, since a Macintosh-compatible window on a PC would violate Apple's copyright and so could not be done.

A merge by popular demand

The fact is, we are seeing a merging of the two architectures, and that's no accident. Eventually, market forces are going to replace the current mishmash of computer architectures with a single standard. In the last two weeks alone, we've seen a major announcement by Apple and Digital Equipment Corp. to develop joint networking products, an announcement by AT&T of its intent to acquire 20% of Sun Microsystems, Inc. and a joint announcement by Microsoft, Ashton-Tate Corp. and Sybase, Inc. to develop an SQL server for sharing data base applications.

In the next five years we may see three major competing end-user architectures: IBM's CUA, a Macintosh/DEC VAX common interface and an AT&T/Sun common interface. By the mid- to late 1990s, the public will demand to be able to get onto a Mac, an IBM PC or a Sun workstation (or their descendants) and, unless they're experts, not even know which one they're using.

This seamlessness will be accomplished largely by more advanced LAN techniques and by further merging of these architectures and interfaces. This merging will also include what are known as high-end workstations and even minicomputers.

There's one final irony to that potential development. With Presentation Manager, IBM and Microsoft have gone 90% of the way toward merging the IBM PC and Macintosh user interfaces.

For the two to merge completely, which is what the public will certainly demand, Apple will have to go the other 10%, and that will mean implementing the Presentation Manager user interface on the Macintosh.

The irony is that if Apple hadn't been so shortsighted by copyrighting its user interface, it could have been the other way around. ●

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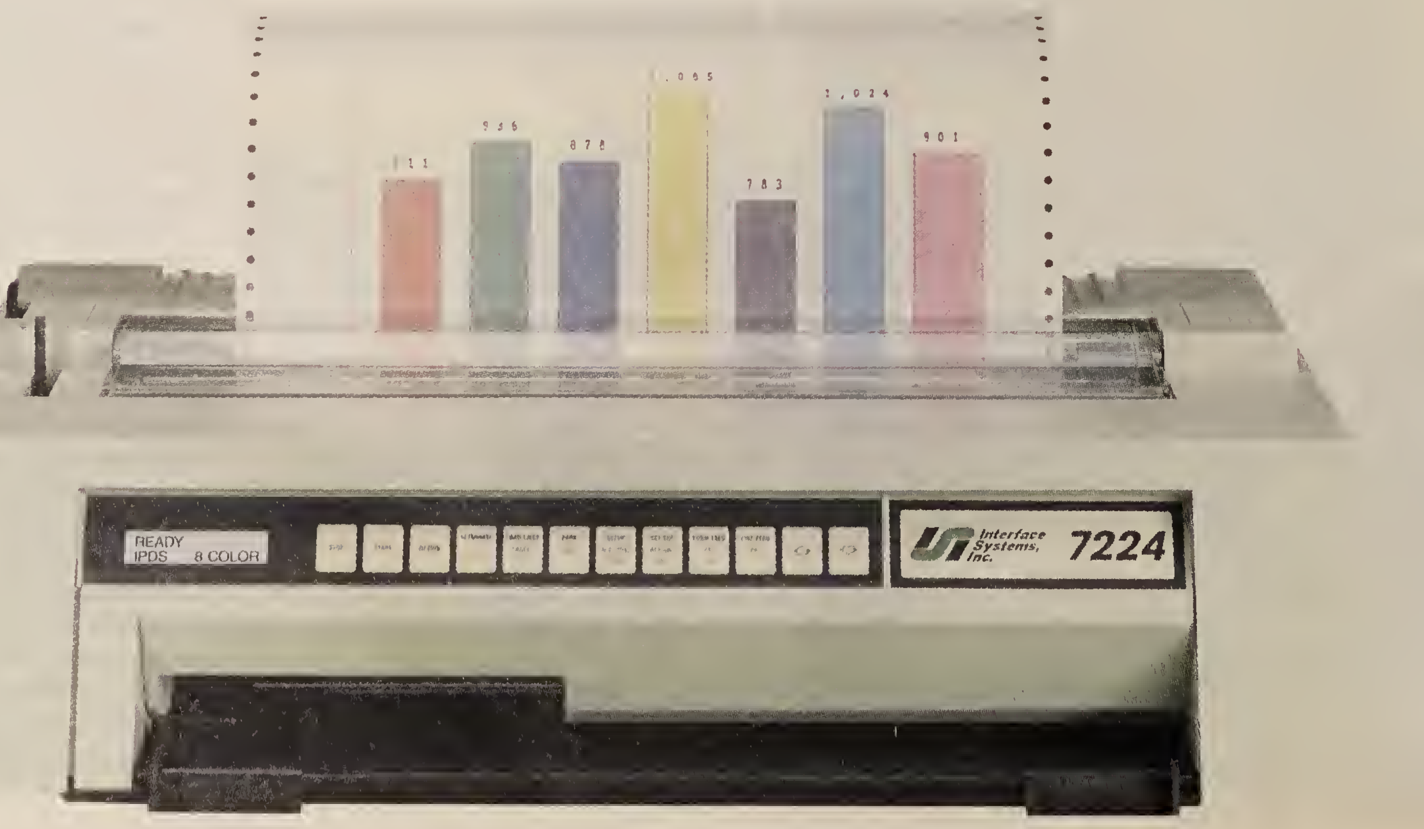


TAKING CHARGE

David A. Ludlum

Breaking all the rules

The other day, I took on the task of serving as the newly appointed manager of end-user computing at my company.

I didn't actually change jobs. I was simulating the position with software for IBM Personal Computer compatibles intended to help computer managers navigate the murky waters of corporate culture and politics.

The software, dubbed Gameplan, from Dean Meyer and Associates, Inc., thrusts the user into the role of a pioneering manager of end-user computing. It offers four choices of corporate culture: traditional, consensus, profit center and futurist. I opted for profit center — characterized by diverse independent profit-and-loss units — and got under way armed with 21 "credibility chips," which I would expend to undertake ventures and, hopefully, get back in greater number as the ventures paid off.

Throughout the exercise, I had 12 projects to choose from: a pilot project, an actual user application, a strategic plan, a briefing paper, a local or long-distance backbone network, a staff steering committee, a user steering committee, a management awareness program, a PC policy statement, an official charter, building an information center and requesting staff.

Wisdom gone awry

Mindful of the conventional wisdom of consultants who urge an understanding of strategic direction before implementing systems, I opted for the formal charter. But I learned that because of my lack of stature and because executives in the company viewed organizational issues as distractions, the move would cost me five chips. The project would occupy half my time for two months.

With half my time still slack, along with that of my two staff members, I put together a strategic plan. It cost me three more chips and consumed the rest of my time for January and a staff member's time for 10 months.

Continued on page 71

Strategist on systems fast track

Liberty Mutual's 31-year-old senior VP started in corporate research

BY ALAN J. RYAN
CW STAFF

There probably isn't a Burke method cited in management texts, but textbook authors might do well to note the name.

The Burke method would read something like this: Take a Dartmouth College graduate, send her through MIT's Sloan School of Management, ship her off to a top insurance company and watch her run — not climb — up the corporate ladder, breaking company records at every level.

Maryann P. Burke's career at Liberty Mutual Insurance Co. in Boston has been a blur. At 31, she is a senior vice-president and manager of corporate research and information systems, one of seven senior vice-presidents in the company, which employs 22,000. Burke became Liberty Mutual's youngest vice-president, its second female officer and, last month, its youngest senior vice-president.

Colleagues say she is ambitious and aggressive as well as professional and friendly. "She'd been working in the company for about a year when I first starting working with her," says Therese Maloney, an executive vice-president in underwriting. "I've seen her develop, make contributions and have the company recognize it.

"She's incisive, a fast learner; she has ideas, and she's able to implement them," she adds.

W. Russell Landberg, an assistant vice-president and manager of Liberty Mutual's data center in Portsmouth, N.H., says Burke is more likely than her predecessors to deal directly with lower level managers, "but not in such a manner as to embarrass her front-line manager."

Burke says she puts in 50 or more hours a week on the job, shuttling frequently between her office in Boston and the data center in New Hampshire and hopping from one Liberty Mutual office to another nationwide.

But she doesn't claim to be all work. A Vermont native, Burke is fond of outdoor activities like running, skiing and tennis. Indoors, she likes to play the piano, which she studied from childhood through high school. Her musical taste runs from classical to pop to jazz. "I don't care whether anybody hears me play," she says. "I just like to play."

PROFILE

Maryann P. Burke

Position: *Senior vice-president and manager of corporate research and information systems, Liberty Mutual Insurance Co.*

Mission: *To shift resources to support insurance professionals with information technology.*

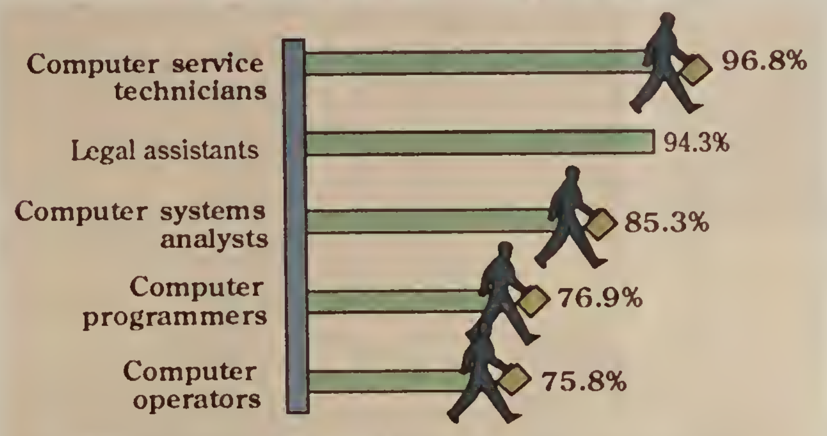
Burke started at Liberty Mutual in the firm's corporate research department after grad-

Continued on page 71

Data View

Opportunity knocks

Four of the five fastest growing occupations between 1982 and 1995 will involve computers, according to a study*



* Includes only detailed occupations with 1982 employment of 25,000 or more

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CW CHART: AMY J. SWANSON

Blue chippers join MIT to peer into the 1990s

BY DAVID A. LUDLUM
CW STAFF

At Cigna Corp., researchers are studying the productivity of systems designers and how Cigna agents have profited from the company's on-line insurance agency automation system.

At the U.S. Internal Revenue Service, researchers are examining the impact of major IRS automation projects on the agency's management and personnel and on companies that help prepare tax returns.

At International Computers Ltd., they are looking into electronic mail's impact on the company and into what that firm calls the "fuzzy benefits" of information technology.

These are among the roughly 30 research projects that have been undertaken through MIT's five-year, $5.6 million "Management in the 1990s" program. The program is entering its fourth year — the year in which its dozen blue-chip sponsors hope to begin disseminating

Continued on page 73

MANAGERS ON THE MOVE

MIS goes to the market; Lotus names VP

After a stint as an MIS director, **Scott Miller** has joined **Group 1 Software, Inc.** as director of technical support, taking responsibility for sales support, customer service, training and quality assurance.

Previously, Miller was MIS director with Arbitron Ratings Co., a Control Data Corp. unit, where he held line management positions with CDC's Information Management Consulting and Cybernet Data services.

Miller said MIS work gave him a good set of experiences, providing sound management skills, a broad perspective on computer technology and an understanding of the needs of those who will now be his customers.

But Miller said he is happy to return to direct customer contact. "I'm more of a marketing-oriented guy. I miss the pulse of the marketplace," he said.

F. Robert Kurimsky has been named staff vice-president for information systems and administrative services at **Philip Morris Companies, Inc.**

Kurimsky previously served as staff vice-president for information and communications services. He joined Philip Morris U.S.A. as manager of manufacturing computer systems in 1974 and was named director of process and management information systems in 1975 and vice-president for information services in 1983. Previously, he worked with Sikorsky Aircraft from 1960 to 1974.

Scott Miller

Tod B. Sperling has been named vice-president of MIS at **Lotus Development Corp.**

Sperling is responsible for management and direction of the information systems division as well as the company's new end-user support group, which handles technical services, applications development and technical education.

He joined Lotus in November 1986 as vice-president of human resources, following a 12-year career with Crown Zellerbach Corp., where he was vice-president of human resources and headed the MIS department.

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Strategist

CONTINUED FROM PAGE 67

uating from Sloan in 1980. In 1982, she was named manager of that department. Next, she got involved in strategic planning and concentrated her efforts on the impact of technology; she was named a vice-president during that time.

In 1985, Burke was given responsibility for information systems in addition to corporate research, and last month she was named to her current post.

Burke's co-workers say her strong points are her understanding of the insurance industry and her ability to view technology through its potential impact on Liberty Mutual's business, rather than for its own sake. "She's probably the best top executive we've had in terms of understanding the need for data processing to provide a service," Landberg says.

He adds that Burke is an effective champion for his data center. "She has been very understanding of the need for high-level support, and she's been good at getting the things we need — fronting our requests through the finance department for personnel, hardware upgrades and the like."

Solution seeker

Burke emphasizes that she is driven by a business point of view rather than a love for computers. Educated in mathematics and management science, she says in college she liked the conceptual side of computers but never wanted to spend a great deal of time programming. "I more wanted to focus on the business problems" and how computers solve them, she says.

Burke knows how to program but generally lacks the desire. "I like to use technology to the extent that it helps me achieve my objectives and not a bit over that," she says. However, she says she's technically oriented enough to be demanding in terms of how her people use technology.

The senior vice-president says Liberty Mutual has a large portfolio of transaction-processing and office automation systems but is shifting resources to support professionals such as underwriters and claims supervisors.

"In the past, we've focused on just making sure all of our transactions were fast and efficient," she says. "Now, we're saying we need to orient our information to professionals who need to access that information and work with it."

Burke is pursuing some such projects through joint efforts with vendors that include Digital Equipment Corp., AI Corp. and Teradata Corp.

With these efforts and others, Burke says she will not rest on the laurels of Liberty Mutual's past technological initiatives but will, instead, take a plunge into new ventures. "I continually try to improve and think about what contributions I need to make to the company," she says. "We want our customers to think that we are aggressively seeking the opportunity that technology gives us."

Ludlum

CONTINUED FROM PAGE 67

Along with the monthly overhead of one chip for January and another, in advance, for February, my undertakings left me with 11 chips. It also left me somewhat apprehensive as I entered my second month on the job. Conventional wisdom wasn't exactly making me a hero in this profit center culture. It was time to implement a real user application.

I enlisted a volunteer rather than a user with clout or the one most in need of automation, with my staff facilitating the development of the application the user identified. We chose to use off-the-shelf hardware and software and to involve the DP staff. I was happy to see this would only cost two chips. It would require half my time for a month as well as half of one staff member's time for seven months. I learned that the DP staff's involvement required one of these months but wasn't needed.

At the rate I was going, I figured I could use a management awareness program. That cost me two chips and half a staff member's time for three months and half of my time for two months.

I faced March with seven chips and a demotion to consultant! Then the executive committee denied my request for a formal charter. I didn't have the credibility for that level of approval. No payoff, and five chips down the drain!

I rejected further ventures to learn the outcome of the ones I'd launched. By the end of July, my overhead payments had left me with one chip. But my management awareness program was complete, and it paid four chips for the two it had cost me — one extra for using real company data. At least I had a positive return, and I moved into August with four chips after overhead. Now my user implementation was done. The payoff was nine chips!

My confidence returning, I entered November with 12 chips and my title as manager restored. My strategic plan was done and paid four chips for the three it had cost me. There was a net gain, but the payoff was diminished by the vague nature of the benefits projected and the fact that organizationwide planning was seen as a waste of time. I was getting a reputation as a planner.

I strode into December with 14 chips, feeling I had learned something. The wisdom of those consultants isn't universal.

Ludlum is *Computerworld's* senior editor, management.

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Blue chippers

CONTINUED FROM PAGE 67

some of the findings.

Launched in January 1985, "Management in the 1990s" is aimed at assessing how changing technologies are affecting organizations' structures, relationships, strategies, personnel and operating procedures.

The research is being conducted by a diverse collection of the faculty of MIT's Sloan School of Management, including experts in applied economics, finance, management and behavioral sciences.

In addition, program sponsors include American Express Co., Arthur Young, Bellsouth Corp., British Petroleum Co., Digital Equipment Corp., General Motors Corp., Eastman Kodak Co., MCI Communications Corp. and the U.S. Army.

Cooperative talk among sponsors

Sponsors, each of which finances the program to the tune of $100,000 per year, said they were attracted not only by the notion of needed academic research that would be directed by practical-minded technology users but also by the interaction among sponsors.

> RATHER THAN focusing on technology, the program is aimed at providing "the big framework" in which to understand developments.

"It wasn't just paying a consultant $100,000 to come in and look at a few projects," said Judith Tomaso, assistant to the deputy IRS commissioner for planning and resources. She said there is growing dialogue among the sponsors.

K. Hugh MacDonald, director of technical projects and strategic programs at International Computers in London, said the sponsors identified joint goals at the outset and have played a greater role in shaping the research than they have in other programs with which he is familiar.

"There is a much closer working relationship between the sponsors and MIT, and we feel we've had some influence on the definition of the program," MacDonald said.

MIT's Roger Samuels, manager of the 1990s program, said the sponsors provide sanity checks as the research progresses.

"We're not interested in blue-sky futurology. We want to look at what is going on today, particularly in leading-edge organizations. We're talking about large-scale corporations changing things," Samuels said.

Rather than focusing on technology, the program is aimed at providing "the big framework" in which to understand developments such as the availability of a new type of microcomputer, he added.

Projects tailored to sponsors

Sponsors play host to several of the research projects. At the IRS, some 1990s program researchers are examining the impact of the introduction of the IRS's automated tax collection technology on the agency's management techniques and employee performance. Researchers are also examining the effects of electronic filing of tax returns on the competitive stance of companies involved with filings, such as accountants, other tax preparers and vendors of tax return software.

At Cigna's Systems Division, researchers are trying to assess how some agents have cut costs or expanded sales by using the company's on-line agency automation system, known as Total Electronic Distribution or TED.

"The purpose of the research is to find out what factors are present — organizationally, marketwise or structurally — that have enabled [the agents] to exploit that technology from a competitive standpoint," explained Lee Morris, the division's senior vice-president of strategic planning.

Cigna is also host to a study of factors that affect systems design productivity, including an effort to measure the value of computer-aided software engineering and to identify the reasons for that effect.

"You can count lines of code, but it tells you nothing about effectiveness and little about efficiency," Morris said. "The basic issue is, are you using the dollars wisely?"

Assessing management, products

International Computers is participating both to improve its own management of technology and to see that its products address emerging needs, according to MacDonald.

International Computers has hosted one project examining the impact of E-mail on organizations and another one looking at what MacDonald calls the fuzzy benefits of information technology.

"These are the benefits that accountants don't like," he says. "They're the ones you can't measure. What is the commercial value of being able to move information from one place to another in five minutes compared with three days?"

The 1990s project got off to a slow start as academics and business-oriented sponsors differed on what was important. Nothing ever got nasty, Cigna's Morris said, and the participants' interests now blend well.

MacDonald also acknowledged the initial difference of views. "Sometimes sponsors talk about research when they really mean development," he said.

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COMPUTER INDUSTRY

INDUSTRY INSIGHT

Patricia Keefe

Vapor need not apply

In its current series of announcements, including one slated for this week, DEC has taken pains to position itself as a leader in the move toward open architectures based on international standards.

While DEC is unlikely to deliver any of this capability before late 1988, the announcements reverse DEC's posture of just one year ago. At that time, DEC was busy blocking access to its VAXBI bus architecture and dodging complaints from users who wanted to link their VAXs and Decnets to incompatible equipment. I'm sure many will remember the Ken Olsen who bad-mouthed standards, especially Manufacturing Automation Protocol.

The new DEC appears to be pulling out all the stops in its efforts to support a whole range of systems, from IBM's VM and MVS operating systems to OS/2 to Microsoft's MS-DOS, to AT&T's Unix System V to Apple's Apple DOS.

No doubt prodding this about-face is increasing pressure from customers who want one-stop shopping from their vendors.

Hurry up and wait

A joint announcement three weeks ago at Macworld Expo highlighted plans by Apple and DEC to integrate their workstation and network environments. But despite a list of specific services the two will provide, users will have to wait until August to get the specifics on how, when and how much. Shades of IBM.

Last week, DEC unveiled what some analysts are calling its answer to IBM's Systems Application Architecture, an umbrella concept designed to tie together all of IBM's disparate systems. In DEC's case, extending its Network Applications Support (NAS) facilities to support users of major operating systems on Decnet/OSI enables DEC to connect its systems with disparate ones from competitors.

Continued on page 76

Walking away from the Crash

Most vendors notch strong quarters, but Tandem, Seagate on skids

BY CLINTON WILDER
and JAMES DALY
CW STAFF

Business for most major computer firms escaped October's stock market collapse virtually unscathed, as several vendors last week reported sharp increases in both revenue and earnings for the fourth quarter ended Dec. 31.

Only two major vendors — Tandem Computers, Inc., which had recently indicated expectations would not be met, and Seagate Technology, Inc. — posted a drop in net income. However, a nervous investment community drove most computer stock prices down after IBM's strong quarter failed to meet expectations (see stories pages 6 and 99).

1987 fourth-quarter earnings

Strong international sales, lower tax rates and better cost controls boosted profits for most industry vendors

	Net income October through December (in millions)	Percent change[1] from 1986	Revenue October through December (in millions)	Percent change from 1986
Apple	$121.4	108	$1B	57
Duquesne Systems	$2.7	41	$12	39
Emulex	$2.3	522	$30.4	18
IBM	$2.1B	50	$18B	6
Microsoft	$35.3	79	$155.9	92
NCR	$161.3	20	$1.8B	18
Seagate Technology	$22.8	(39)	$332.4	32
Software Publishing	$2.5	105	$14	61
Sun Microsystems	$14	65	$235.1	102
Tandem	$23.7	(12)	$282.3	18
Tandy	$130.7	26	$1.3B	9
Teradata[2]	$1.9	117	$19.4	89
Unisys[3]	$216.9	—	$2.8B	16
Wang[4]	$34.1	—	$784.7	17

[1] Parentheses indicate decrease
[2] Net income excludes $1.1 million in extraordinary tax credits
[3] Reported $188.5 million loss in 1986
[4] Reported $78.6 million loss in 1986

CW CHART

Among the fourth-quarter success stories were Unisys Corp., Apple Computer, Inc., Sun Microsystems, Inc., NCR Corp., Wang Laboratories, Inc., Microsoft Corp., Computer Associates International, Inc. and Software Publishing Corp. Data General Corp. reported its best financial news in some time, earning $12.4 million after several quarters of losses or meager profits.

Although the stock market's drop did not bring the heavy repercussions some had feared, analysts warned that most companies will heed Tandem's example and make cautious optimism the order of the day when predicting results for the first quarter of 1988.

"If there is any downturn, it will most likely occur in the March quarter," said Peter Labe, vice-president of research at investment firm Drexel Burnham Lambert, Inc. "Consequently, most companies are being careful not to over-report their fourth quarter and saving up a little something for January."

Although Tandem's $282.3 million in revenue for the quarter represents an 18% jump over the $240.2 million recorded for the same period last year, the firm's net income fell 12% to $23.7 million, or 24 cents per share.

"Their revenue is not what it was expected to be, but it is clear that they are not in any trouble," said Omri Serlin, editor of the Los Altos, Calif-based "FT Systems" monthly newsletter. "They say that the market crash has lengthened the procurement cycle for some companies and resulted in delays in decision making. But if you look at the other companies, you've got to wonder if this is true."

Other companies that reported quarterly results last week include the following:

Unisys. Completing its first full year as the combined Burroughs Corp. and Sperry Corp., Unisys ended the year with notable strength in sales and new orders both in the U.S. and abroad.

Revenue was $2.8 billion, up 16% from the $2.53 billion reported from continuing operations one year earlier. Net income was $216.9 million, or $1.09 per share, compared with a year-earlier loss — which included restructuring charges — of $188.5 million, or $1.56 per share.

"Unisys was a ray of sunshine in the gloom about IBM," said George Podrasky of Duff & Phelps in Chicago. "The comments on U.S. orders were particularly encouraging. Investors are a little premature in thinking that a gradual industry upturn is over."

For the year, Unisys sales rose 7% to $9.71 billion, but the company attributed much of the gain to a weaker dollar. Profits were $578 million, or $2.93 per share, compared with 1986 losses of $43.4 million, or 54 cents per share.

Wang. The Lowell, Mass.-based vendor showed a strong reversal from year-earlier re-

Continued on page 80

The Sematech showdown

How a Texas town roped that thar consortium

BY JAMES A. MARTIN
CW STAFF

AUSTIN, Texas — Never mind this city's reputable semiconductor manufacturing industry, attractive climate, low housing costs and diverse cultural life. It was good old Texas determination that ultimately brought Sematech, the much sought-after chip consortium, to this state capital [CW, Jan. 11].

"The governor, House Speaker Jim Wright and the congressional delegation, working in concert with the city of Austin, the University of Texas and the Austin Chamber of Commerce, made a strong, collaborative effort," said Rich Thomas, director of state affairs for Texas Gov. William P. Clements Jr.

As a result, Texas beat out other contenders, including California and Massachusetts, for the consortium. Sematech plans to spend $250 million annually to create 800 jobs directly and 2,400 indirectly, with the intention of returning the U.S. to a dominant role in the worldwide semiconductor industry.

Sematech will begin operations during the first quarter of this year in a 300,000-sq-ft former Data General Corp. manufacturing facility and is expected to begin manufacturing by year's end.

The search for a Sematech site began in earnest last spring. Early on, Jake Pickle, a U.S. Congressman from Austin, was instrumental in securing Sema-

Continued on page 76

Migent CEO quits; firm's woes mount

BY STEPHEN JONES
CW STAFF

INCLINE VILLAGE, Nev. — The timing of Carl Gritzmaker's resignation as president and chief executive officer of Migent, Inc. could have been better.

Gritzmaker's departure last week came at a time when the software publisher has scaled back its expectations for quarterly sales and profits because of delivery delays on key products.

The most conspicuous late product is Migent's Emerald Bay multiuser network data base package, which company executives originally said would be available in April 1986. The company had hinted that Emerald Bay would be available earlier this month but said last week that it will ship by the end of March.

Gritzmaker's departure was in part the result of Emerald Bay's upcoming release and Migent's new push into corporate America, according to Charles Hamilton, who moved into Gritzmaker's slot after being vice-president and managing director of Migent's European operations.

As the company moves from the start-up phase into a production period, Hamilton said, a shift was needed in management. Gritzmaker, who had played the role of entrepreneurial leader at Migent since its inception, was less inclined to stick with the day-to-day operations of the company and reportedly left

Continued on page 80

Daisy first workstation vendor to license SunOS

BY JULIE PITTA
CW STAFF

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. said earlier this month that it has licensed its SunOS operating system to Daisy Systems Corp. for use in Daisy's Intel Corp. 80386-based workstations.

Daisy is the first workstation company to license the Sun operating system, which is based on Unix. The financial arrangements of the agreement were not disclosed.

Release of SunOS across Daisy's line of 80386-based workstations is scheduled for the second half of this year.

Once the premier player in the computer-aided engineering market, Daisy has struggled recently, reporting a series of escalating losses last year. Daisy has been criticized for using proprietary hardware and software in its product line — a direction that the company has since reversed.

Standard features

Daisy said it intends to adopt the Transmission Control Protocol/Internet Protocol, Sun's Open Network Computing/Network File System and the X11/News graphics interface standards.

"We're pleased to see people developing on a number of different platforms," said Scott McNealy, chairman and chief executive of Sun, which uses systems based on Motorola, Inc. 68000 series microprocessors and Sun's Sparc architecture.

Daisy is currently porting its applications developed on Denix, its own version of Unix, to SunOS. "The most difficult challenge in all of that was in the graphics area, where it always is," Daisy President Norman Friedman said.

Keefe

FROM PAGE 75

At the Communication Networks '87 show in Washington, D.C., today, DEC is expected to announce support for IBM's VM and VSE operating systems along with support for IBM's Professional Office System under DEC's Mailbus.

And at Dexpo East next month, major third-party Apple software developers are scheduled to announce support for DEC systems.

DEC's relationship with Apple forms another continuous thread linking these announcements.

A position of strength

Analysts agree that the announcement strengthens both vendors' positions vis-a-vis IBM. Apple stands to gain the most from a revenue standpoint, according to Bob Randolph, director of the DEC Advisory Service for International Data Corp., a market research firm in Framingham, Mass. "It means they're big-time now," Randolph says.

The pact also gives the minicomputer maker a three-pronged approach to the desk top: the ability to integrate IBM Personal Computers, the Microvax 2000 and the Macintosh. DEC could benefit mightly from the latter and is expected to resell the Mac.

Despite protestations to the contrary from DEC executives, DEC has failed miserably with the low-end desktop. But it seems that DEC is the only one who doesn't get the joke — at least publicly — concerning its low-end strategy.

Shotgun engagement?

While the Apple-DEC relationship is advantageous to both, it appears rushed. Francis Dzubeck, president of Communications Network Architects, a consultancy in Washington, D.C., suggests that DEC had to announce its relationship with Apple prior to unveiling its extentions to the NAS facilities.

DEC's reluctance to formalize a relationship with Apple could have stemmed in part from Apple's traditional lack of a strong business system. However, Apple's success last year in breaking down the barrier to corporate sales in general and the rising incidence of Macintoshes installed at VAX sites may have soothed DEC's fears.

But then again, DEC's plunge into the annoying '80s genre of "concept" announcements has probably given it something else to worry about. DEC has essentially promised to tie its users into the major competitive system environments in use today — which is no piece of cake and a potential risk. It's hard to believe any vendor would so willingly hand over access to its customer base.

Yet if DEC fails to live up to its word, these promises will haunt the company to the grave. Any failure to deliver means that DEC, along with IBM, AT&T, Codex and everyone else out there busily unveiling strategic directions and umbrella concepts, will find out pretty quickly that users are in no mood to tolerate any jive.

Keefe is a *Computerworld* senior editor, networking.

Showdown

FROM PAGE 75

tech's first $100 million in government funds, which helped Texas win friends on the Sematech committee. Clements wasted little time in recognizing the importance of Sematech to the economically battered state and invited site selection members to the governor's mansion for a heart-to-heart talk.

Last summer, Austin city officials formed a nonprofit organization called Sematech-Texas to act as overseer in negotiating efforts. The group saw to it that Austin accommodated Sematech's wish list in every way, especially regarding the consortium's immediate need for a clean room — the sterile environment required for semiconductor manufacturing.

A Sematech-Texas task force put together an ambitious construction project in order to have a simulated clean-room environment ready for the site selection committee's visit.

Aside from political machinations, Austin was chosen for Sematech because of its strong existing base of semiconductor and technology manufacturing and research concerns.

Among the companies with operations in Austin are IBM, which employs 7,000 and manufactures its PC Convertible; Motorola, Inc., with a 5,100-employee manufacturing plant for the 68000 microprocessor series; Texas Instruments, Inc.'s Data Systems Group, which focuses on artificial intelligence systems; and Dell Computer Corp. and PC's Limited, headquartered here.

'Stacks up well'

"Sematech needed a place with a good manufacturing infrastructure, and Austin stacks up well," said Michael Boss, a semiconductor industry analyst for Dataquest, Inc. in San Jose, Calif.

Another factor was the decision of a similar research consortium, Microelectronics and Computer Technology Corp., to choose Austin as its site in 1983. MCC has many of the same corporate members as Sematech and has a research program devoted to semiconductor packaging and integration.

In addition to bids from Massachusetts, California and Arizona, North Carolina's $147 million financial proposal to place the consortium at Research Triangle Park was a leading offer. But one strike against that site was the nearby presence of a Mitsubishi Semiconductor, Inc. plant, sources said.

"A consortium that's trying to build credibility for American semiconductor manufacturing would not be too crazy about locating next door to a Japanese chip plant," said one observer, who asked not to be identified.

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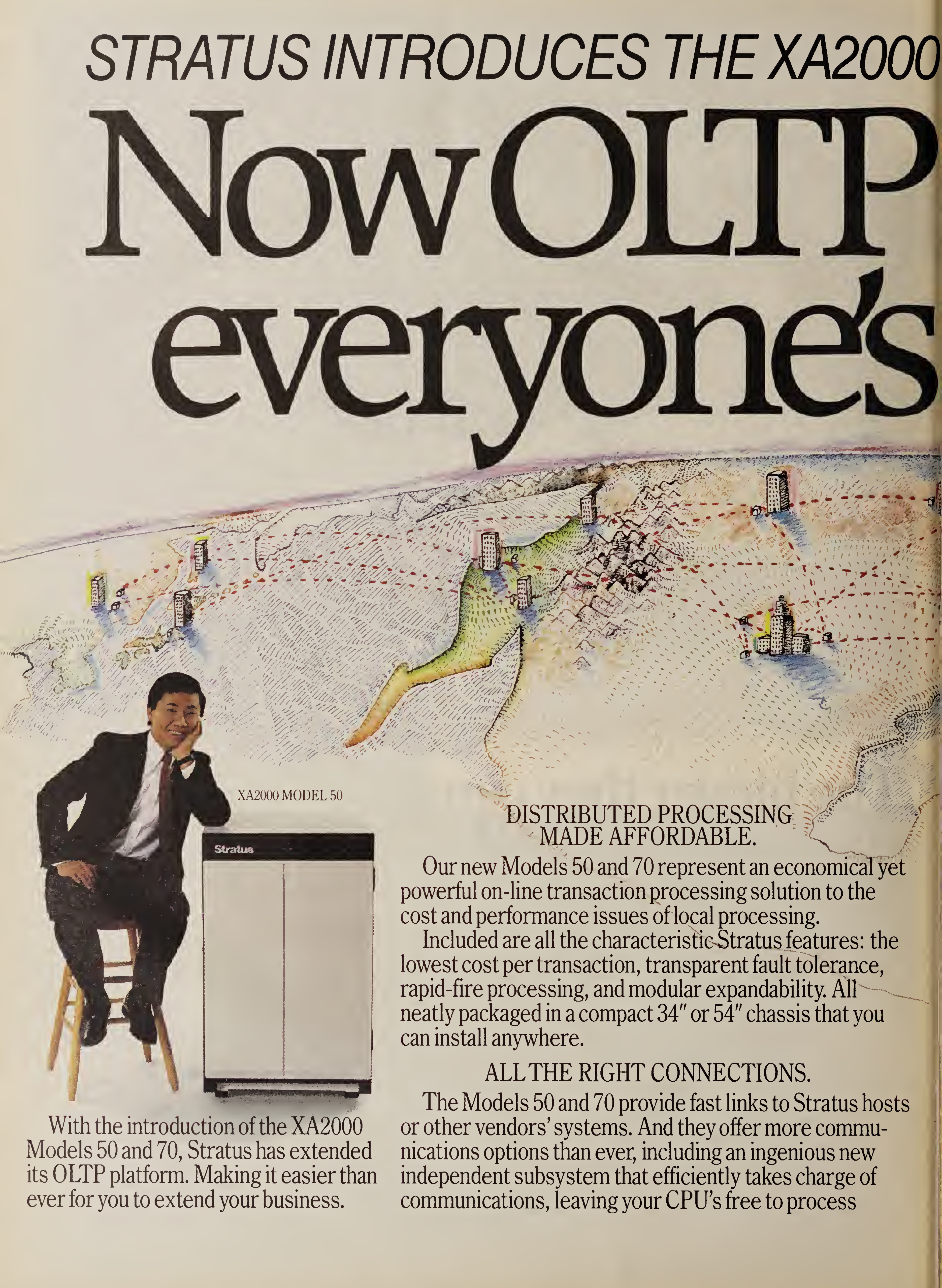

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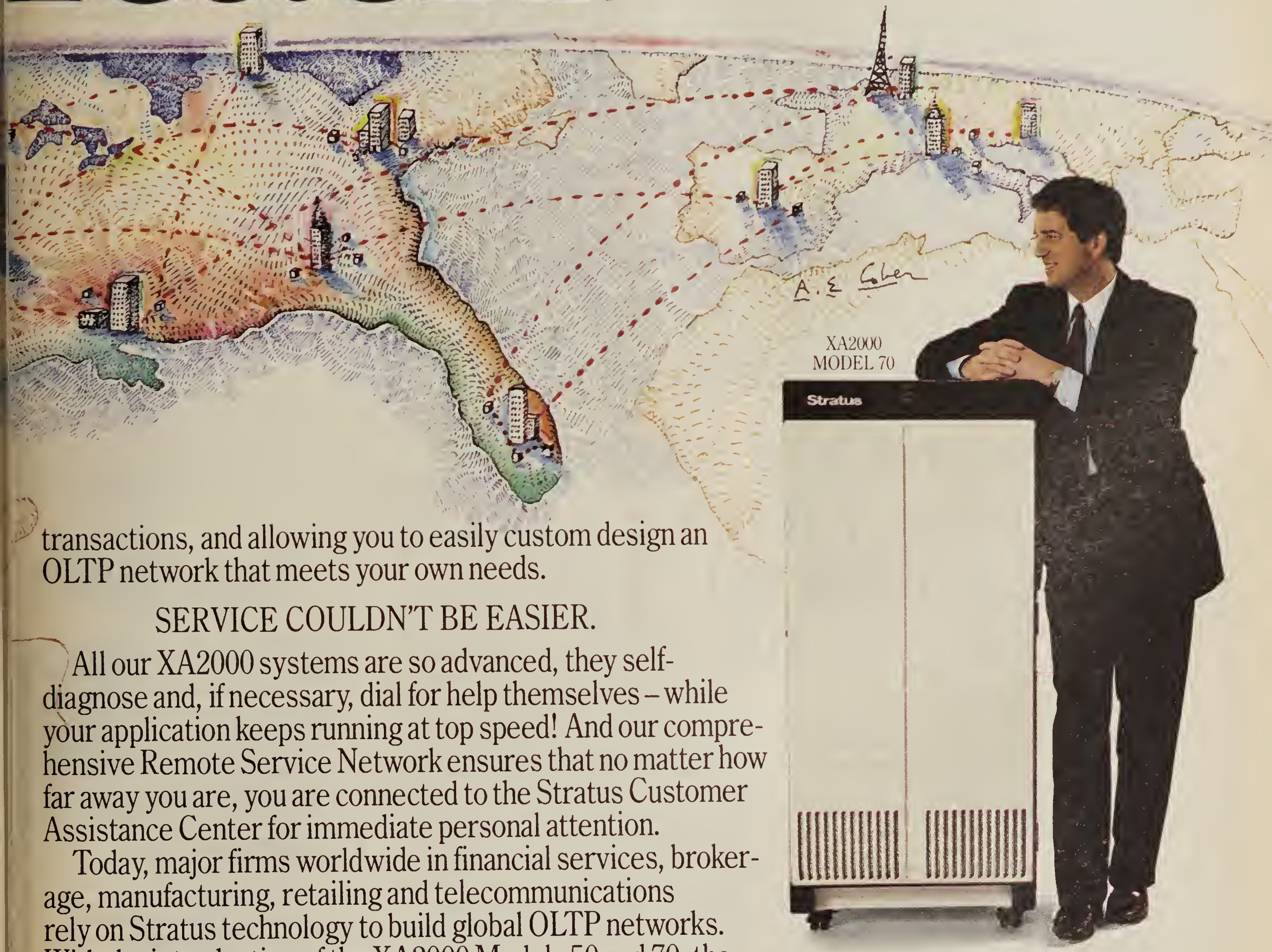

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Walking away

CONTINUED FROM PAGE 75

sults, posting earnings of $34.1 million, or 21 cents per share. For the same period last year, Wang had a loss of $78.6 million, with per-share earnings 49 cents in the red. Revenue clocked in at $784.7 million, up 17%. In the year-earlier quarter, Wang included a $37 million restructuring charge.

NCR. NCR's international business bounced off the dollar's tumble to help the firm post quarterly records for earnings and revenue. NCR's earnings rose 20% to $161.3 million, or $1.79 per share. Revenue increased 16% to $1.82 million, up from $1.57 million a year earlier.

"The collapse of the dollar overseas was a very important part of this," said Don Young, an analyst with Sanford C. Bernstein & Co. "About 54% of NCR's business came from the foreign quarter, and with the dollar taking a tumble, their costs dropped significantly."

NCR also achieved record levels for all of 1987. Net income increased 25% to $419.3 million, and revenue grew to $5.64 billion, up 16%.

Computer Associates. The software giant announced quarterly revenue of $195 million, up 45% from last year's $134.4 million. Net income for the Garden City, N.Y., firm was $42.8 million, or 54 cents per share, up 72% from $24.9 million, or 32 cents per share. The 1987 figures include results from the firm's Uccel Corp. operations.

Prime Computer, Inc. The Natick, Mass.-based vendor's net income for the quarter rose 50% to $21.3 million, or 44 cents per share, up from $14.2 million, or 29 cents per share, for the same quarter in 1986. Revenue rose 16% to $267 million from $230.9 million over the comparable period last year.

For the full year, Prime's net income totaled $64.8 million, or $1.32 per share, a 38% increase over 1986's $46.9 million, or 97 cents per share. But Prime fell short of reporting its first billion-dollar year, as revenue rose 12% to $960.9 million from $860.2 million in 1986.

Data General. President Edson de Castro credited the firm's MV series of minicomputers with its 9% rise in revenue, which reached $342.9 million, compared with the $313.3 million recorded in the same quarter last year.

Net income for the Westboro, Mass.-based firm's first quarter hit $12.4 million, or 43 cents per share, up from $3.3 million, or 12 cents per share, a year earlier.

The recently ended quarter's figure included an extraordinary tax credit of $2.1 million, or 7 cents per share; last year's report included a nonrecurring tax credit of $3 million, or 11 cents per share.

Sun. The Mountain View, Calif.-based vendor's revenue was $235.1 million, compared with $116.5 million a year earlier. Net income was $14 million, or 38 cents per share, up from last year's $8.5 million, or 28 cents per share.

"I expect even larger gains [for Sun] over the next two quarters," said Bob Herwick, senior technology analyst with Hambrecht & Quist.

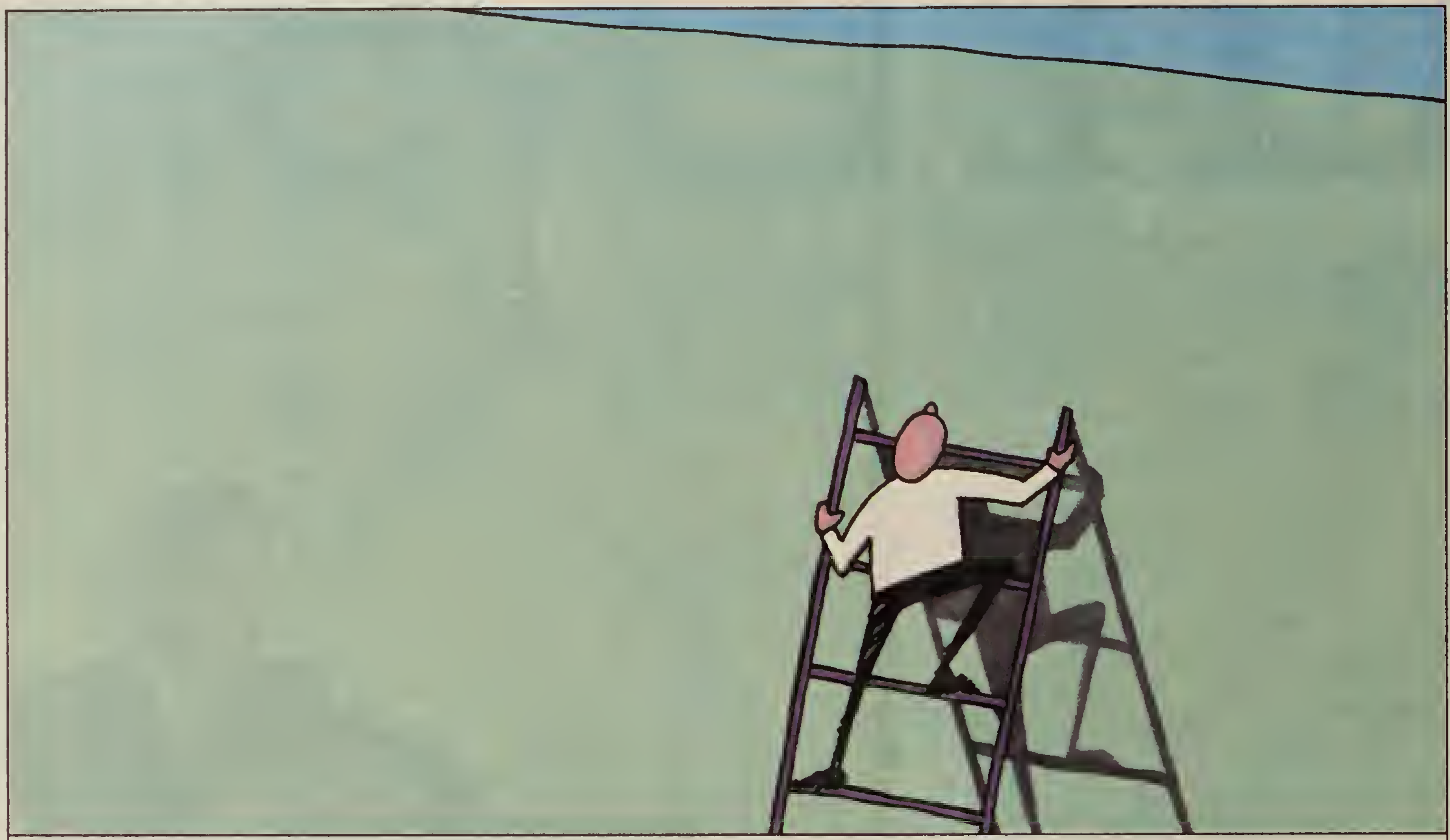
Apple. Apple continued its recent good fortune in the microcomputer industry's traditionally strong December quarter, reporting its first billion-dollar quarter. The Cupertino, Calif., firm more than doubled its earnings to $121.4 million, or 92 cents per share, and increased sales by 57% to $1.04 billion.

Microsoft. The micro software giant exceeded analysts' expectations, particularly in revenue growth — a pattern that seems increasingly familiar for the Redmond, Wash.-based firm. Sales nearly doubled to $155.9 million, and earnings advanced 79% to $35.3 million, or 63 cents per share.

"Their sales are partially a reflection of PC clone vendors still doing very well against IBM," said Bob Therrien of Paine Webber, Inc.

Seagate. The Scotts Valley, Calif., disk drive manufacturer tempered a 32% increase in revenue with a 39% drop in net income. Revenue was $332.47 million; net income decreased to $22.8 million, or 46 cents per share.

Seagate attributed the drop in net income to costs incurred from an increase in manufacturing capacity and start-up costs associated with several new products.



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Migent CEO quits

CONTINUED FROM PAGE 75

on amicable terms.

"Carl is more of a start-up guy, and when a company gets to a certain size, his kind of skills aren't as applicable," said Wayne Ratliff, president of Ratliff Software Production, Inc. and chief developer of the Emerald Bay data base. Ratliff was a key developer of Ashton-Tate Corp.'s flagship Dbase software.

Under Gritzmaker's guidance, Migent acquired its popular Ability integrated personal computer package from Xanaro Technologies, Inc. and attained, in first-quarter 1987, its first profitable quarter after four straight years of losses. With consumer-oriented products like Ability in place, the company will now try to crack large corporate accounts with a variety of products based on the Emerald Bay technology, Hamilton said.

Migent Vice-President of Marketing David Patrick was named to the firm's board of directors.

Gritzmaker will serve as a consultant to Migent for an indefinite period, Hamilton said. Gritzmaker could not be reached for comment last week.

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Firms pursue LAN managers

High demand due to increase in PC use, rapid technological evolution

BY SHERYL KAY
SPECIAL TO CW

As companies try to tap into the decentralized computing power provided by installed personal computers, they are looking to MIS for professionals familiar with the management and technical challenges of local-area networks.

The relative newness of the field and the quick changes that occur in technology mean there is not a large supply of professionals with LAN knowledge. Technicians and managers seeking a vital place in a company's implementation of technology can find a niche in the LAN field.

"The technician responsible for the LAN has an enormous impact on the productivity of a business," says Jim Young, managing director of information systems for the Wheeler Group in New Hartford, Conn. "Because it's still an emerging technology, the functionality of LANs is constantly expanding and improving. LAN management also comes with a certain amount of autonomy, unlike traditional communications functions."

Job titles for LAN professionals vary greatly from company to company. In a firm with few LAN nodes in place, most of the responsibilities of LAN management are handled by one person. In an environment with many nodes, a team of professionals handles different aspects of LAN support.

Team leadership

The team is led by a manager responsible for final approval of the appropriate LAN for all projects, planning for future expansion and the direction of the department's activities.

Other team members include network hardware and software specialists who help evaluate and test LAN products, configure and install the LAN, troubleshoot and perform system upgrades.

The LAN administrator maintains the system on a daily basis. He operates a help desk function, acting as the focal point for the LAN users as well as the interface to MIS. Administrators are responsible for loading software, disk management, setting up security procedures and rectifying printer output problems.

Qualifications rigorous

Qualifications for a LAN manager include a minimum of five years of data processing/data communications experience.

"A good project management background, along with strong data communications knowledge and a clear understanding of the user needs are essential for such a manager's position," says Nancy Alter, superintendent of network management for General Accident Insurance Co. in Philadelphia. "A PC background is a plus, but it's really not necessary if you've got all the rest."

> "DON'T GET STUCK drinking from a fire hydrant. There's a lot of information about LANs to get across, and some of these two-day courses jam too much down your throat."
>
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Technical specialists should possess more in-depth PC knowledge. A strong background in data communications, particularly in LAN methodology, is also important.

As companies add LAN support positions to the payroll, salaries will become more competitive and more stable. Currently, salaries can range from $18,000 to $50,000 per year for LAN professionals. Low salaries are typically found in companies in which LANs are viewed as PC add-ons, says Richard Lumyou, president of The MIS Group, a Miami-based consulting firm.

LAN managers are hard to find because there is no consistent set of qualifications. Each company defines the job differently. "That niche hasn't matured yet to a position where there is a predetermined set of experiences required to obtain the job," the Wheeler Group's Young says.

Technical specialists are the most difficult to find, Lumyou says, primarily because of the depth of specific network knowledge required. "Anyone with a good computer background could learn LAN concepts, but with the hundreds of vendors out there, it is very hard to find someone who will know the exact LAN that a given company has installed," he says.

On-the-job training

As an alternative to finding LAN technicians on the open market, companies are providing on-the-job training. Many LAN vendors also offer courses to train customers in the use of their gear.

Seminars are also offered by independent sources. Ronald Brown, national director for telecommunications consulting for Coopers & Lybrand, warns, "Don't get stuck drinking from a fire hydrant. There's a lot of information about LANs to get across, and some of these two-day courses jam too much down your throat."

Postgrad education

Instead of the one-shot seminars, Brown advises professionals to attend pre- and postgraduate courses that highlight LAN technology. Some of the highly respected schools offering these programs include New York University, Golden Gate University and Temple University.

Professionals who gain experience in LAN positions can look forward to high visibility within most companies.

Such visibility can lead to significant career growth. From the position of LAN manager, a professional may go on to become director of office automation or manager of voice/data telecommunications.

"LAN technology is the future of DP because it is a cost effective way to bring about productivity," General Accident's Alter says. "Those who get involved with it now will really benefit later on, because they will be the ones who worked with LANs from the beginning."

Kay is an MIS human resources consultant based in Tampa, Fla.

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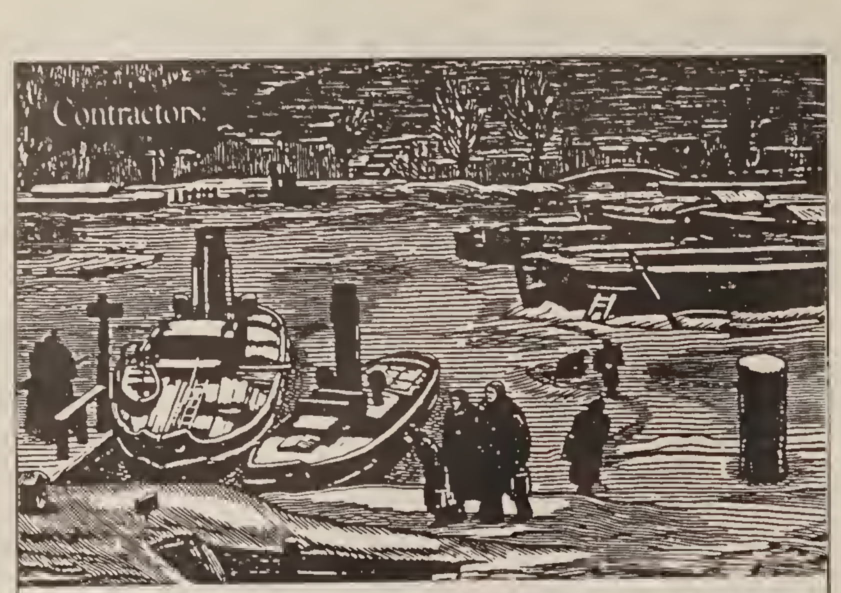

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To put the new Computer Careers Network to work for you - regionally or nationally - call the sales office nearest you. Or contact John Corrigan, Recruitment Advertising Director, at 617-879-0700. And if you hurry, you can still get in on the special low introductory offer.

Sales Offices: **BOSTON**: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, (617) 879-0700; **NEW YORK**: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652, (201) 967-1350; **CHICAGO**: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018, (312) 827-4433; **LOS ANGELES**: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714, (714) 250-0164; **SAN FRANCISCO**: 500 Airport Blvd, Suite 400 Burlingame, CA 94010, (415) 347-0555

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CNR, Inc., is a rapidly expanding company specializing in the application of high technology to all aspects of communications. CNR has, since its founding in 1972, demonstrated particular expertise in secure and reliable communications. The company's new communications concepts, generated and refined in its own R&D program, are developed into working prototypes and advanced communication products through a process which emphasizes the active involvement of engineering staff members in all aspects of the company's operation. CNR is located in Needham Heights, Massachusetts, adjacent to Route 128 and Route 9.

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CNR's active research and development programs are integrated and focused towards the development of complete digital transmission communication systems. These systems rely on CNR's advanced technologies for error correcting coding and highly reliable network protocols. CNR's communication systems may utilize high frequency radio, satellite, meteor burst and landline transmission; CNR's communication devices, primarily message switches, network protocol controllers and modems, often require the development of new hardware and software approaches to achieve their functional and performance goals. Our systems are consistently proven superior to all competition.

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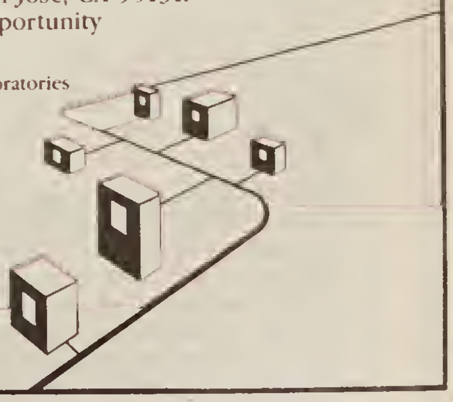

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You choose the region. If you wish to recruit within a specific area, you can advertise in the regional editions of the newspapers you choose - East, West, or Midwest. Of course, national buys of individual newspapers or various combinations are also available when you need to extend your reach.

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Cincinnati, OH 45237 (513) 821-8275
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nna computer/net

APPLICATIONS

ROVER Technology Company:

Immediate openings in Software Development.

We are a pioneer in distribution software, providing customized software systems for Fortune 500 clients. **ROVER**® products are sophisticated decision-support systems. These systems include graphics and data interfaces to our proprietary algorithms designed for logistics operations.

The **ROVER Technology Company** is staffed by a select group of highly qualified individuals with backgrounds in computer science, management science, and transportation operations. The atmosphere is dynamic and professional. We demand a great deal from each other, and enjoy a great deal of satisfaction in return. We also enjoy excellent compensation, benefits, and advancement potential.

Senior Software Developers

We seek **Senior Software Developers** who can assume leadership roles in engineering reusable software to meet development and product useability requirements. This is a fast-paced environment where your skills, creativity, and technical decisions will have a direct impact on the product. You must have significant software development experience in multiple hardware and software environments. We look for a strong professional history in distribution and logistics software and/or interactive graphics and user interfaces. You must have background in applied math, OR, or computer science.

Programmer/Analysts

We also seek ambitious **Programmer/Analysts** who will work with our senior developers to build software tools and interactive application software based in our proprietary technology. You must be a self-starter with at least one year of commercial experience in FORTRAN using on-line development aids. A working knowledge of C is required. Experience using application libraries (database, graphics, data entry, etc.) is essential. You must have a history as a software professional, preferably in software product development, and a background in applied math, OR, or computer science.

Senior Technical Project Managers

Additionally, we are seeking ambitious **Senior Technical Project Managers** with an interest in over-serving our clients. You will work with our clients in applying our proprietary technology to solve their distribution problems. You should have 7 to 10 years' experience designing and developing software applications. We look for a strong professional history and academic background in a technical field.

Qualified individuals are invited to reply to:

The ROVER Technology Company
DEVELOPMENT GROUP
One Bala Plaza, Suite 511
Bala Cynwyd, Pa. 19004
(Philadelphia, PA area)

KENDA SYSTEMS, INC.
BOSTON
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SOFTWARE CONSULTANTS

KENDA SYSTEMS Is a progressive software services organization providing engineering consultants on a contractual basis to the East Coast high tech community.

Talented engineers who have confidence in their ability and take pride in their work are welcome to participate in our national expansion by registering with KENDA SYSTEMS.

Forward resume to D. Sierra.

2 Manor Parkway
Salem, NH 03079
603/898-7884

GREATER BOSTON AREA

SYS-38 SPECIALISTS

Prominent high-tech mfr. seeks tech contributors for new RPG-III devel. & implem. Prior large proj. exp. w/online DB desired + min. 3 yrs. business apps. knowl. Desirable SUBURBAN location w/ nat'ly. recog. employer. Salary to $37,000. Call the Data Processing Division (in confidence), **ROBERT HALF OF BOSTON, INC.** 100 Summer Street, Boston, MA 02110. Tel. 617-423-1200. Personnel Consultants. Client company assumes all fees.

SYSTEMS ENGINEER

Design and development of telecommunication software to provide for a communication path for data transmission at the data-link level and perform high level design of telecommunication features for computerized switching systems having distributed flexible architecture. Job Involves system verification by algorithm analysis and system simulation. Experience not required but candidate's graduate study must include one course in Telecommunication Systems, one course in Comparative Computer Architecture, one course in Analysis of Algorithms, and a project Involving Software for Communication link at the data-link level. Candidate must have a Master's Degree In Computer Science. Salary offered $3,083.33 per month, 40 hours per week, 8 A.M. to 5 P.M., M-F. Send resume to Illinois Department of Employment Security, 401 South State Street - 3 South, Chicago, Illinois 60605. Att: Mrs. S. Chalem, Ref. #7678-S. An Employer Paid Ad.

PACBASE
or
IMS DB/DC

Your IMS DB/DC & / or PACBASE experience may be your ticket to an exciting and rewarding career opportunity with our "Build for the Future" company. Immediate & future needs now exist in SE / NE / MW USA for application development professionals. Call or send resume to Don Thompson, CMSI, 7948 Baymeadows Way, Suite 160, Jacksonville, FL 32256, (904) 737-8955. Contractors also needed.

TELECOMMUNICATIONS SOFTWARE DESIGNER. Develop and design call processing software for class 5 distributed microprocessing digital switching system from all phases of software development. Investigate existing system and implement new features to meet engineering requirements through detail design, coding and unit and integration testing. Some projects performed on client sites at various geographic locations. Minimum Requirements: M.S. in Computer Science. Two years' experience in the position offered. One course in each of the following: Microcomputer Architecture, Microprocessor Interface, Data Communication and Teleprocessing, Programming Languages (including C), Operating Systems (including UNIX*). Must be willing to travel an average of 25% of time, domestically. 40 hrs per/wk. 9:00 a.m. - 5:00 p.m. $34,000 per/yr. Submit resume to: Illinois Dept. of Employment Security, 401 S. State St., 3S, Chicago, IL 60605, Attn: Ms. Marie Ninneman, Ref: #7733-N, An Employer Paid Ad.

*Unix is a registered trademark of AT&T.

SOFTWARE ENGINEER

Responsible for the development, maintenance and enhancement of code for company's schematic capture design systems for engineering workstations and mainframe computers to design integrated curcuits and printed curcuit boards. Will also lead other developers in the continued development and maintenance of products. Software will be written In PASCAL language, under both UNIX and VMS. Master of Science degree in computer science and 2 years experience which shall include design and implementation of graphics systems and use of PASCAL, UNIX and VMS software systems. 8 to 5; $36,000/yr. Resume: 7310 Woodward Ave, Room 415, Detroit, MI 48202. Ref: #0988. Employer Paid Ad.

COMPUTER PROGRAMMER

Maintain and develop computer programs for local store of major retail discount chain. Program and maintain system for in-house Inventory control and ordering, accounting, pricing and forecasting. Program report formats and screen layouts based on departmental requirements. FACOM, OSIV, UNIOS JIS COBOL and BASIC. $28,000 yr. 3 yrs. exp. req'd. Job site and interview Simi Valley, California. Send resume to: CW-B5007, Computerworld, Box 9171, Framingham, MA 01701-9171.

DP PROFESSIONALS

Immediate opportunities currently exist for Senior Technical Professionals with the following expertise.

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IBM MVS, VM and Communications Systems Programmers are needed. Must be familiar with O/S Internals and related software products and have performed O/S installations, modifications and performance tuning. Salaries $39-$72K

DATABASE SPECIALISTS

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Positions are available in North East, Mid-Atlantic and Sunbelt locations.

For more information call Mike Loftis at (301) 770-5290 or send resume to:

DCSI
6290 Montrose Road
Rockville, MD 20852

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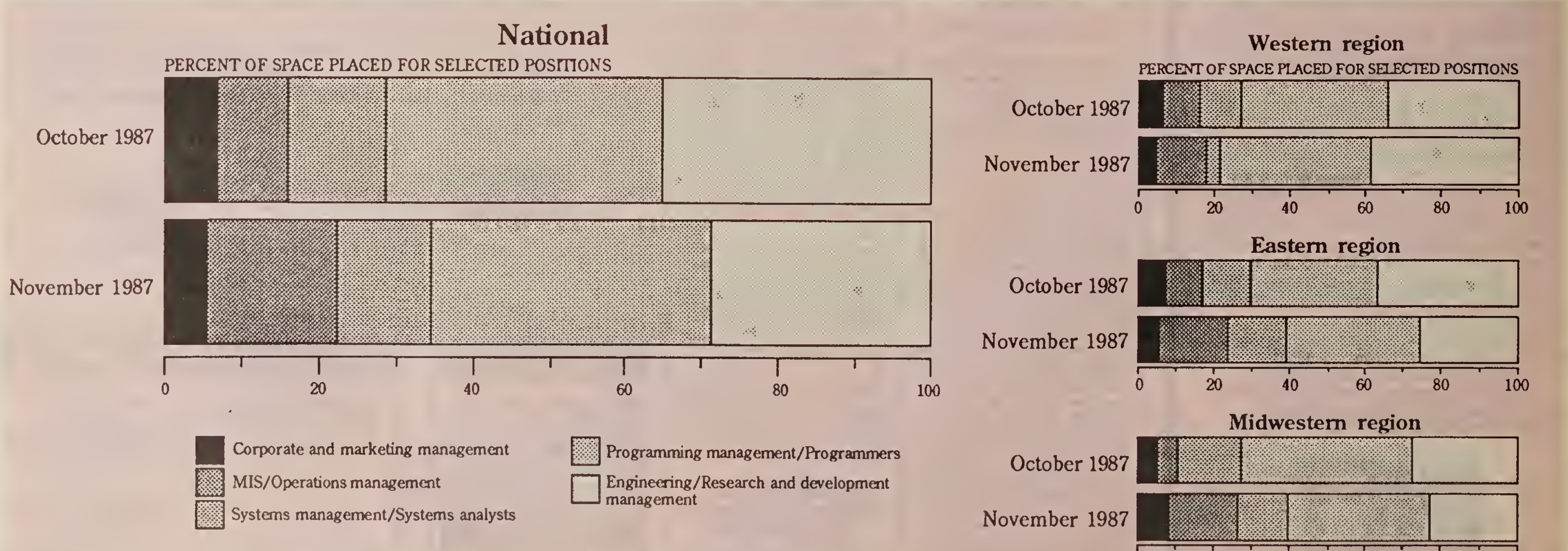
Rapidly expanding health information company seeks a talented programmer experienced in VMS, BASIC and Powerhouse. Send resume and salary requirements to:

Robert A. Reid M.D.
President
Commonwealth Clinical Systems, Inc.
1650 State Farm Blvd.
Charlottesville, VA 22901

Scientific Programmer/Analyst
Design, develop programs on CYBER, VAX and IBM Mainframe using Fortran, IMSL, SAS, BMDP, SPSS and graphic packages. Maintain, update statistical packages incl survival, randomization, SIR S/W. ETHERNET, BITNET, ARPNET maintenance exp. necessary. MS Computer Science. 40/hrs week. $30,000/yr. 1 year experience. Resume: NC Geller, Dept. Biostats, Sloan-Kettering Ctr., 1275 York Ave., NY, NY 10021.

CAREER INDEX

Computer recruitment advertising activity*



*Analysis of computer recruitment advertising space in *Computerworld* and selected major U.S. newspapers

INFORMATION PROVIDED BY CW PUBLISHING, INC.'S RECRUITMENT MARKET RESEARCH DATA BASE
CW CHART

Information Systems Auditors

Levi Strauss & Co., the privately held leader in apparel manufacturing, is currently seeking two key individuals to join our EDP auditing team. Both positions will focus on systems development and acquisitions. You will also be responsible for production applications and computer facilities reviews including audit planning, execution, report preparation and consultation. Travel of up to 20% is required.

Supervising Auditor This opportunity calls for a degree in Computer Science or Business Administration (CISA preferred) and 5+ years' information systems audit experience including at least 2 years in supervision. Preferred applicants will also possess a reasonable command of computer assisted audit techniques, data base technologies, structured analysis and mainframe environments.

Senior Auditor Requirements include 3+ years' information systems auditing experience and 3+ years' experience as an analyst programmer working with IBM mainframes and HP minicomputers. Familiarity with data bases, data modeling, structured analysis, MVS, VM, CICS, ACF II and TSO is desired.

Our employees enjoy a beautiful, relaxed work environment, an outstanding benefits package including profit sharing, and considerable responsibility and independence. Interested parties should respond expeditiously to Levi Strauss & Co., Employment Dept. JW-02, P.O. Box 7215, San Francisco, CA 94120-6914. We are proud to be an Equal Opportunity Employer.

Levi's
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Software Engineers

ComputerPeople Consulting Services is expanding its professional staff in our Columbus, Ohio office. We have immediate needs for experienced specialists in software development, telecommunications technology, telephony, and real-time.

We require a BS degree in computer science or electrical engineering and a minimum of one year of professional experience is strictly required. An MS degree is a plus. Environment is C/UNIX in a state-of-the-art system.

Applicable skills include:

- **Real-time experience**
- **C and UNIX**
- **Networking software**
- **Telephony software design**
- **Device driver experience**
- **Experience in entire software project life cycle**
- **Terminal emulation software**
- **Bisync protocols**
- **Stored program systems and communications networks**
- **Hardware background with data communications experience**
- **Database**

For immediate consideration please send your resume with information as to GPA, Visa status and/or citizenship to Mr. Jeff Miller, ComputerPeople Consulting Services, 50 Northwoods Blvd., Worthington, Ohio 43085. An equal opportunity employer.

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The Ohio State University Office of Business & Administration is seeking an Assistant Vice President to direct and manage the Office of University Systems. This individual will develop and implement policies regarding administrative and business data processing, voice, data and video networks, and telephony services; plan, organize and direct data processing activities, including systems analysis, programming and computer operations; manage, recruit, and select staff; coordinate computer operations with other computer centers; manage an 18,000 station campus-wide telephone switch including data and video communications networks; and prepare reports on data processing and communications plans, projects, performance and fiscal activities.

Candidates must have a master's degree or an equivalent combination of education and experience. Extensive progressively responsible management experience, preferably in a university environment, and experience with a large and complex MSV/XA data processing operations with a budget exceeding $5.0 million and a staff of 100 persons preferred. Telephony experience with premise based switch serving 10,000 stations and communication facilities including microwave and fiber optic circuits is desired.

Salary: Negotiable. To assure consideration, materials must be received by February 19, 1988. Send resume and a cover letter to: Professional Employment Services, The Ohio State University, Lobby, Archer House, 2130 Neil Avenue, Columbus, OH 43210. An Equal Opportunity, Affirmative Action Employer.

UNIX Systems, Networking, Database

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UNIX operating systems: device drivers, internals, ports, and user interface (SVRx, 4.x).

Networking: X.25, BX.25, TCP/IP, Ethernet, Datakit; product development.

Database: Unify and Ingres.

Send a current resume to:

LAI
1901 N. Naper Blvd.
Naperville, IL 60540-1031
Attn: NCW.0125

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HARDWARE/SOFTWARE ENGINEERING OPPORTUNITIES

Allen-Bradley, is the leading developer-manufacturer of total factory automation systems. We are seeking talented engineers for the following positions:

Hardware/Firmware Sr. Design Engineer: Working in our I/O Product Design Group, your responsibilities will include the design and development and/or liaison of Single Point I/O products (including adapter products and analog sensing circuits), coordinating the technical activities of engineers, and interfacing with other departments, outside design houses and vendors. You will design product hardware and firmware at the module and system level and be responsible for appropriate design specifications, and testing and evaluation procedures in its development stages. In addition, you will be responsible for project planning as well as time and cost estimates to meet the development specifications. You should have a BSEE or equivalent, outstanding communication skills and 3+ years hardware/firmware design engineering experience in an industrial setting.

Sr. Software Development Engineer: You will take a leading role in the conceptual design of the complete system, coordinating the technical activities of a small development group, interfacing with other departments and vendors. Develop software for an industrial automation equipment environment. This is a key opportunity to build on your BSCS, BSEE degree or equivalent (MS preferred, PhD considered) and a minimum of 3-5 years of software engineering experience. Knowledge of "C" programming, DEC-VMS, MS-DOS, multitasking relative operating systems, and experience using current software development methodologies would be a plus.

Sr. Software Design Engineer: You will take a leading role in the development of software for realtime control applications using microprocessors. Activities, will include conceptual design/development, complete test/debug, and documentation of the assigned project. In addition, you may also be responsible for coordination of a small development group. You should have a knowledge of the "C" language, experience with realtime operating systems and a minimum of a BSCE, BSCS, BSCIS, or equivalent. Knowledge of DEC-VMS, data communications and 68000 family microprocessors is desirable.

These positions carry a competitive salary and benefits program plus an excellent relocation package. Send your resume and current salary history to:

Mary Messerlie, Human Resources
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- Systems Analysts
- Programmers and P/A's - Minimum one year RPG and IBM S/3X.
- MIS Manager/Consultant - Requires applications, business, data processing, and customer support experience.
- Systems Engineer - Requires Telecommunications experience. Will work with hardware and system software.

We are ten years old, employ 35 associates, have full benefits, very competitive salary, and an 8 to 4:30 work day. We believe in professionalism, high ethics, customer satisfaction, quality DP philosophies and methodologies, team work, treating employees right, and recognizing and respecting good efforts.

Send resume in confidence to:

Link Computer Corporation
Personnel Department
317 E. Pleasant Valley Blvd.
Altoona, PA 16602
Or call Karen Mann at (814) 539-8785
Evenings/Weekends at (814) 536-0026

GREATER BOSTON AREA

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SUBURBAN based nat'l. firm seeks 3 Sr. P/A's to add to staff for apps. devel. teams. Prefer 3+ yrs. IBM MVS CICS COBOL large-scale proj. exp. Oppty. to join ind. ldr. as it continues record growth into 1988. Salary to $39,000 + reloc. Call the Data Processing Division (in confidence), **ROBERT HALF OF BOSTON, INC.** 100 Summer Street, Boston, MA 02110. Tel. 617-423-1200. Personnel Consultants. Client company assumes all fees.

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data processing

SENIOR INFORMATION CENTER ANALYST

4GL in VM Environment

If your specialty is developing Decision Support Systems in a VM environment with an emphasis on fourth generation languages, Miller Brewing Company can bring out the best in you. Our large scale Information Center is a sophisticated, results-oriented environment charged with supporting one of America's largest and most progressive brewers.

You will have project leadership responsibilities in planning and conducting feasibility studies, and in systems analysis, design and development. You will also have key user training and support responsibilities.

A minimum of 2 plus years decision support system development experience in a VM environment is preferred. Knowledge of QMF with SQL/DS, FOCUS, SAS or DB2 desirable, with two or more years MVS/TSO experience. Superior organizational, problem solving, project management and technical training abilities are necessary. BSCS or equivalent preferred.

Miller Brewing Company is a subsidiary of the Fortune 50 Philip Morris Companies Incorporated. We offer competitive salary, complete benefits, and relocation assistance to the attractive, comfortable Milwaukee area. Send resume or letter to: Corporate Recruitment Manager, Dept. #1000-88, MILLER BREWING COMPANY, 3939 W. Highland Blvd., Milwaukee, WI 53201.

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Data Communications
Division

SOFTWARE ENGINEERS AND SALES SUPPORT ANALYST

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SENIOR SOFTWARE ENGINEER

You will work in a UNIX™ communications environment, using SNA, TCP/IP, Token Ring, Ethernet, X.25, WAN and Network Management. Positions available for software test engineering and software engineering, **located In Dallas, Texas.** A BS/CS degree or equivalent is required, as well as 3+ years' experience.

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As the project leader for UNIX™, OS/2, and DOS development projects, you will be responsible for definition, design, code and test functions. You'll also coordinate product support, internal training and outside software vendors, and interface with user organizations. Leaders in the areas of software testing and product quality planning are also needed. Individual contributors with broad data communications experience will find challenging assignments related to network connectivity and the rapidly emerging LAN technologies. **These positions are located in Dallas, Texas.** Excellent communication skills and at least 6+ years' experience are required. A BS/CS degree or equivalent hands-on experience is also required.

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You will be working as part of Harris' sales team to supply Harris solutions to customers problems. You will be responsible for making technical presentations on the Harris product line and preparing competitive analysis. **Positions are available in New York, Chicago, Dallas, and Los Angeles, as well as other major metropolitan areas.** Excellent presentation skills and previous software support experience are required. A BS/CS or equivalent is also required, along with experience in MS-DOS, XENIX and UNIX™. A knowledge of Token Ring, Ethernet and SNA is preferred, as well as a thorough understanding of PC applications development.

If you apply yourself, you'll find we'll give you the responsibility and support you need to develop your ideas and enhance your skills. We also offer a competitive compensation/benefits package. For immediate, confidential consideration, please forward your resume to: Harris Data Communications Division, Personnel Staffing, Dept. CW/0125, P.O. Box 809022, Dallas, TX 75380-9022. Or call 1-800-828-9990 ext. 7153. We are an equal opportunity employer M/F/H/V.

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HARRIS

Data Processing

Information Systems Consulting

Peat Marwick Main, an international accounting and consulting firm, is seeking experienced systems professionals to join its Catalyst Consulting Group in Chicago. Catalyst is an information technology firm of Peat Marwick that specializes in state-of-the-art software engineering products and related services.

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If the challenge of a consulting career with one of the world's largest professional services organization appeals to you, please send your resume, in confidence to:

Mr. Kenneth M. Coppins
KPMG Peat Marwick
CATALYST
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● IDMS Systems	Dallas	$49K
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● CICS Systems (3)	Dallas	$45K
● MVS/XA Systems	D/FW.	$47K
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● VAX MIS Dir.	Dallas	$70K
● IMS Consultant	Memphis	$42K
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Send resume in confidence to:

Harold M. Harrison
InfoTech Search Consultant
8700 King George Drive, S.102
Dallas, Texas 75235
(214) 638-0058

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St. Louis, MO 63105
(314) 727-1535

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ASSOCIATE DIRECTOR OF INFORMATION SYSTEMS

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Julie Auster
Director of Personnel
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SOFTWARE SPECIALIST - Arlington, TX. Analyze users needs; design and develop computer applications and specifications using HP3000, DEC VAX and DG MV Series, POWERHOUSE; Interface with client users and provide them with technical instruction; enhance existing products. One year experience. 40 hr/wk. $34,000/yr. Apply at Texas Employment Commission, Arlington, TX, JO #4640867, or send resume to: Texas Employment Commission, TEC Building, Austin TX 78778, JO #4640867. Ad paid by equal opportunity employer.

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Send Resume and Salary History in complete confidence to:

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Providence Gas Company is offering an outstanding opportunity in a progressive and expanding 4381-13 VM/CMS, DOS/VSE environment, for an experienced systems programmer. Must have three plus years experience with one year at the Senior level. Salary level of $35K+ depending on experience.

Applicants must be proficient in the following unsupervised procedures.

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The following experience will be considered a plus.

- 1.3.5 VSE to 2.1 or 3.1 conversion
- VTAM
- CMS/EXEC Writing
- 3370 to 3380 conversion
- IDMS/R 10.x
- SNA

This is a new position in a six person Tech Support Group. Principals only please. Please respond with resume and salary requirements to:

Judith A. Garbett
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For Los Angeles, CA Area

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COMPUTER TECHNOLOGIES DIVISION

Experience in management of college level credit programs and faculty supervision required. Extensive knowledge of mainframe and microcomputer operation and good communication skills required. Masters in Computer Science or related field required; Ph.D preferred. Industry experience in data processing and management preferred. Entry level salary range $37,000. to $43,272. depending on experience and qualifications. Effective July 1, 1988.

Send letter, resume and transcripts to Personnel Office, Anne Arundel Community College, 101 College Parkway, Arnold, MD 21012, by February 29, 1988.

AA/EOE

MANAGER, INFORMATION SYSTEMS

Sunny Amelia Island, Florida is the setting for an outstanding opportunity with this division of a Fortune 100 corporation. We seek a hands-on manager to direct the development and implementation of long-range Business and Process Information Systems. Bachelor's degree or equivalent experience required, along with in-depth knowledge of IBM System/36 and PC hardware, RPG II and BASIC. Minimum five years in Data Processing, including management responsibility. Competitive salary and excellent company benefits will reward the candidate with the take-charge attitude required to meet the limitless challenges offered in this key position.

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The **King Faisal Specialist Hospital and Research Centre** in Riyadh, Saudi Arabia offers exceptional opportunities for experienced and qualified Data Processing Specialists. The Hospital, a 500-bed specialty referral complex with a large outpatient clinic, is the Kingdom's premier hospital dedicated to providing high quality health care to the citizens of Saudi Arabia.

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Data Base Analyst—B.S. degree in Computer Science or equivalent. Five years DP experience with 2 years in data base design, control and management.

Programmer Analyst—2-4 years of college level course work in Computer Science, 12 months experience utilizing CICS & COBOL.

All applicants must be thoroughly familiar with IBM hardware. DL-1 database, CICS & COBOL, & DOS/VS required. Hospital DP experience highly desirable.

Commitments are for 24 months. Salaries are attractive and the exceptional benefits include 30 day annual paid vacation, free transportation, furnished lodging, bonus pay and bonus leave. The selected candidates will be employed by and work directly for the Government of Saudi Arabia.

For further information and/or to apply, please call our toll-free number **(800) 251-2561** or send your resume to: **HCA International Company, P.O. Box 550, Dept. CW-12588, Nashville, TN 37202.** HCA is an Equal Opportunity Employer.

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SYSTEMS AND TECHNICAL SUPPORT

We are interested in an individual with a very strong technical background with experience in systems design and software programming. The hardware is a Sperry 1100/71 with an attached virtual processor operating in VS9, therefore, experience in the VS9 operating system on Sperry's 90 series mainframe is absolutely essential. For our unique distribution application, we have developed our own systems and software, therefore, the successful candidate must have proven experience in the design and implementation of large scale business systems preferably in distribution, fulfillment or direct response applications.

We are an industry leader in our field and are presently going through a period of phenomenal growth. We expect this growth to continue on into having to expand or replace our current hardware. As a result, the individual we are seeking must be capable of directing and coordinating a large scale conversion and have proven past experience in doing so.

This year we are planning to set up a remote site in our newest facility in Los Angeles. Previous telecommunications experience would be a definite asset.

With an attractive Midwest location, we offer a competitive compensation package with excellent benefits including a 401K. If you meet our requirements and are looking for a challenging opportunity to work in a fast paced environment, send current resume with salary history and expectations to:

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The University of Notre Dame invites applications and nominations for the position of Assistant Provost for University Computing. The Assistant Provost will report to the Vice President/Associate Provost and function as his/her chief advisor and associate, working cooperatively with the directors of administrative and academic computing services and with various units of the University to assess needs, to prepare reports, and to oversee the implementation and coordination of plans, budgets, policies and operations.

Qualifications include experience in the management of computing services in an academic environment, effective communication skills, and substantial technical expertise in computing systems. Preference will be given to candidates who have a Ph.D. degree and experience as a member of a university teaching-and-research faculty.

The salary is negotiable, based upon experience and qualifications.

Responses, complete with resumes and names of three references, should be sent before February 15, 1988, to: Roger A. Schmitz, Vice President and Associate Provost, 202 Administration Building, University of Notre Dame, Notre Dame, Indiana 46556.

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DATA PROCESSING PROFESSIONALS

Illinois Power Company, a progressive, medium-sized midwestern utility, has the following challenging opportunities. BS or BA in Computer Science, Computational Math, Business or a related field is preferred.

SENIOR DATA BASE ANALYST

Requires 3 or more years experience in data base administration working in an IBM environment. High level data modelling experience desirable. We seek an experienced data base administrator with good communication skills to do corporate data modelling, data base analysis and design, data consulting for project developers, data base product support and new product research.

PROGRAMMERS AND PROGRAMMER ANALYSTS

Requires 3-8 years experience in analysis or programming. COBOL necessary, with experience in CICS, IMS/DB, IBM's Data Dictionary, TSO/SPF, PANVALET, VSAM, IBM-Assembler, and structured design preferred. Identify needs, recommend software/hardware solutions, design programs and systems, oversee all phases of system development and implementation.

PROGRAMMER ANALYST— EDUCATION SPECIALIST

Minimum of 4 years experience in analysis and programming required. Experience in an education function supporting activities related to information systems beneficial. Recommend and implement information system education programs for executive, professional, clerical and data processing staff. Perform cost/benefit analysis, make presentations and evaluate education programs.

COORDINATOR NETWORK OPERATIONS

Requires 2-3 years experience in administration of an IBM 3270 network. Direct the activities of Network Analyst/Operators and clerical personnel in support of users of an approx. 1000 terminal local and remote data network. Administer equipment inventory and leases, assist in planning for the implementation of new requirements to meet anticipated growth.

CICS SYSTEMS PROGRAMMER

Requires 4 years experience in CICS system programming environment, BAL and COBOL, both Macro and Command programming, CICS internals, CICS exits, Debugging and performance tuning. Knowledge in DMS, ACF/VTAM, IMS/DB or TSO/SPF desired.

MVS SYSTEMS PROGRAMMERS

At least 4-6 years experience in an IBM MVS system programming environment and demonstrated experience in Assembler language, VSAM, COBOL, SYSGEN and SMP required. Knowledge in JES 2 and MVS internals, hardware and software problem determination, and MVS performance analysis desired. Knowledge of TMS, CMF, RESOLVE, FDR, SYNCSORT, Look, TSO/SPF, PANVALET helpful.

—ENVIRONMENT—

A challenging roster of systems are supported for business and engineering related activities throughout the company. Some 65 on-line systems as well as nuclear systems are part of the technical challenge present.

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DATACOM IDEAL Prog/Anal.	26-33K
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"The bottom line is results. What I'm seeing, thanks to Computerworld, is beyond our expectations."

— Max Steiner
Director of Marketing
Kenda Systems, Inc.

Max Steiner remembers his days as a salesman, when he would make calls and, invariably, see a copy of *Computerworld* on the desks of his clients. That alone made an impression on Max.

Today, he is Director of Marketing for Kenda Systems, a software services firm with offices in New England, New York and Washington, DC, and specializing in placing contract engineers within the high-tech industry. Having grown by 400 percent annually for the last three years — and having placed several hundred professionals in less than three years, Kenda Systems is an acknowledged leader in the industry.

The impression that *Computerworld* has made on Max early on has been a lasting one. He directs Kenda's advertising. And he directs it to *Computerworld*.

"We are looking for national exposure. First, we want to make people aware of Kenda Systems and then increase the number of resumes sent to us. I believe that greater recognition will lead to greater interest — and understanding of what we can do for people.

"It only follows that we can best accomplish our goals by advertising with the industry leader — it answers all our needs. Computerworld *reaches the qualified software professionals we're looking for.*

"And we have the proof. We've seen as much as a 30 percent increase in resumes coming into our offices. Plus we're getting everything we hoped for: national recognition and responses from top people from all over the country. Clearly, we're quite pleased with the results.

"We're hearing from software engineers who are impressed with the fact that Kenda's in Computerworld. *The bottom line is results. What I'm seeing, thanks to* Computerworld, *is beyond our expectations."*

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Irvine, CA 92714 (714) 250-0164

SAN FRANCISCO: 18004 Sky Park Circle, Suite 100,
Irvine, CA 92714 (415) 322-3314

An IDG Communications Publication

PROGRAMMER/ANALYST: Analyze and eveluete existing and/or proposed systems and design, develop, implement and enhance software written in "C" end BASIC for a UNIX base system. Responsible for planning, designing and writing technical documents for general users and administrators of UNIX System V. Documentation will include both tutorial and reference information. Position also requires using AT&T 3B2 hardware to test the efficiency of e INFORMIX data base system. Responsibilities include providing technical support and direction, reviewing work in progress and evaluating results operating with latitude for unreviewed action or decision. Assume responsibility for training of non data processing users in the facilities of the system. Requires bechelors degree in computer science and 2 years direct experience in the job being offered and described. Selary $37,998. per/yr, 40 hrs per/week. 8 a.m. to 5 p.m., M-F. Mail resumes to: Colorado Department of Labor and Employment, 600 Grant Street, Suite 900, Denver, CO 80203-3528, Order #2861229.

COMPUTER ANALYST

Professional organization located in NW Indiana is seeking a computer analyst with a minimum 3 years experience in data processing on minicomputers using database techniques. The ideal applicant should have knowledge of PRIME computers and programming experience in FORTRAN, and COBOL. Personal computer experience is also desirable.

Excellent salary combined with a comprehensive benefit program. Send letter of interest, resume and salary history to:

Personnel Manager
Canonie Environmental
800 Canonie Drive
Porter, IN 46304

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ENGR, Sr. S/W: Dsgn., Implement, laboratory model & test telecommunications s/w for bitstream processing systems; evaluate dsgn.; support dsgn. during introduction to mfrg; provide s/w doc. & support during introduction stages to customers. Min. MS or equiv. in Electrical or Elec. Eng. 3-5 yrs. exp. as S/W-F/W Engr. Applicants must have exp. in dsgning & implementing telecommunications s/w using diagnostic tech. in testing telecommunications h/w, using Assembly lang. on Motorole & Intel microprocessors; knowl. of transmission & signaling tech. used to transmit voice & data in digital networks & PABX & central office transmission & signaling interface. Job Site/Interviews: Mt. View, CA. $44,000/yr. Applicants clip ad and send resume to: Job Order #AW13712, P.O. Box 9560, Sacramento, California 95823-0560 by February 9, 1988.

PROGRAMMER/ANALYST: For state egency develop report layouts, screen layouts & database review. Design & develop logical, usable & workable program spec's. Design, code, test & document complex programs to incl development of Syst's Testing, User Training Syst's Acceptance & Handover for Social Service Applications. 1 1/2 yrs exp or 1 1/2 yrs rel programming exp. Must know: COBOL, TIP, CFD, MAPPER, ICLT, Sperry 1100 hardware. $33,000/yr, 40 hrs/5 days/wk. Datronics, Inc., 675 3rd Ave, NYC 10017. Resume: Att: ML #39.

SYSTEMS ENGINEER - Assist in the modification of client's financial computer equipment. Require Bachelor's or equivalency in Data Processing or Computer Science and two years experience in DYL 280, DB design, SQL, IDMS with ADSO, DATACOM with IDEAL. Salary $35,000. Job in Woodland Hills, CA. Send resume to: Robert Brown, 6319 DeSoto Avenue, #406, Woodland Hills, CA 91367.

COMPUTER PROGRAMMER/ANALYST: Plan, develop and maintain dataprocessing systems: DG S/140, DG Eclipse MV/7800; Analyze and configure existing system for future needs; Execute operetions and oversee systems development and maintenance; communicate and coordinate DP procedures and technical information with department heads. Requires BS in computer information systems and 1 year in job offered plus 1 year experience computer operator/programmer on above systems; 11:30 e.m. to 8:30 p.m. 40 hours/week. $26,000. per year. Job in Redmond, WA. Send resume to: Employment Security Dept. E.S. Div. Attn: AEC 123818, Olympia, WA 98504.

APPLICATIONS ENGINEER

Develop software and programming for business computer network using knowledge of herdware, software, networking end operations programming in order to control merchandise inventory. To develop systems for comparison analysis of product lines end product lines sub groups, and to develop computer image processing systems to demonstrate variations in stylings and there by essist sales presentations. Bachelors degree + 1 year experience in the job or design engineering involving computer systems; or Masters degree in electrical engineering in lieu of 1 yeer experience in the job or design engineering. Must have working knowledge or college level class in image processing. Must have working knowledge of FORTRAN computer languege. $2,629./mo. 40 hours per week. Job site and interview in Arcadia, CA. Send this ad and your resume to Job # WS13877, P.O. Box 9560, Sacramento, CA 95823-0560. No later than February 9, 1988.

SYSTEMS 38 PROGRAMMER ANALYST

Mystic Color Lab, a leading mail order photo finisher, located on the shoreline in historic Mystic Conn. is seeking an experienced RPG III Programmer. Experience with systems design and online programming preferred. Job involves new systems development and maintenance of existing system. We offer a competitive salary, benefits packege and opportunity for advancement. Send resume and salary history to:

Art Wallace

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Programmer/Analyst - Analyze, design, develop, implement and debug telecommunications and business applications. Utilize UNIX and C software, CPM, MS DOS, IBM PC hardware. Bachelor's degree in Electrical/Electronic Engineering or Computer Science. 3 years experience performing above. $42,000/yr. 40 hrs/wk. Send resume/letter in duplicate: RVB #113, Room 501, One Main Street, Brooklyn, NY 11201.

ENGINEER, SOFTWARE. MSCS plus background in UNIX, VMS, MS DOS. Must also know LANS (Ethernet plus IBM token ring), ISO/OSI protocols, 8086 essembly and C languages. Duties: Design and implement ISO/OSI protocols on VMS and MS DOS operating system, debug and test programs to insure quality control. $35K per annum. US citizens or permanent residents only. Job site: Scotts Valley, CA. Send this ad and resume to: Job #WS 13087, P.O. Box 9560, Sacramento, CA 95823-0560 not later than 2/9/88.

SYSTEMS MANAGER

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Robert A. Reid M.D.
President
Commonwealth Clinical Systems, Inc.
1650 State Farm Blvd.
Charlottesville, VA 22901

ASSISTANT PROFESSOR OF COMPUTER SCIENCE - LHU is seeking candidates for this position which includes teaching courses in computer and information science es well as working with curriculum development, student advisement, committee assignments and professionel and community service. A doctoral degree in computer science or information science preferred. Exceptionally well qualified candidates with e master of science degree in computer science or informetion science will be considered. Academic or professional experience in the field is required. The University is a primarily undergraduate, stete supported, co-educational institution of 2,800 students. The University seeks diverse faculty to develop e multi-cultural and multidisciplinary curriculum. An equal opportunity effirmative action employer, the University is ectively recruiting women and minorities. Candidates should submit a letter of application, resume, an unofficial ecademic transcript and at least three letters of recommendation or the names, addresses and telephone numbers of et least 3 references to the following: Robert E. Seyfarth, Search Cheirperson, LHU, Lock Haven, PA 17745. (717) 893-2011 (Applications will be reviewed beginning 2/1/88, and continue until the position is filled).

SCIENTIFIC PROGRAMMER III

Be part of e team of researchers investigating concurrent systems for expert systems. Duties will include: 1) Design and development of software tools to support concurrent problem-solving frameworks that will run on hardware simulators; 2) reformulating and reprogramming existing applications in the frameworks; and 3) conducting measurements and analysis of simulated systems. In eddition, the programmer will be required to contribute ideas to other research areas in the project; Such as simulator, language, and operating system designs. 3 years experience and B.S. in computer science or equivalent degree and three years experience is required. Familiarity with the LISP programming language and ability to design and build knowledge and engineering software tools, especially in the area of blackboard problem-solving framework, are also required. Applicant must also be experienced in building expert systems in information fusion and/or signal understanding. Salary $44,890 annum. Job site: Stanford CA. Send this ad and a resume to Job #SK13334, P.O. Box 9560, Sacramento, CA 95823-0560 not later than 2/9/88.

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Applicants must possess bachelor's degree or equivalent with mejor field of study in Computer Science, Math, or Engineering, plus 3 years experience in ACP/TPF airline environment progremming.

Education and experience will be found applicable if applicant has a combination of professional development courses and work experience shown to be equivalent to e BS in Computer Science, in addition to 3 years of ACP/TPF airline programming as a lead programmer.

Salary to $17/hour for e 40 hour work week. Additional salery mey be offered if applicant possesses additional education or experience up to $22/hour.

Apply at the Texas Employment Commission, Ft. Worth, Texes, Job Order #4640234. Ad paid for by an equal opportunity employer.

Systems Engineer for computer and software consulting firm in Columbus, Ohio, to design, develop and implement systems software in C and the UNIX(R) Shell using the UNIX(R) operating system; write interface mechanisms in real-time between the planning and control function of an overall automated manufacturing environment; design, test, and modify communications between remote sections of manufacturing process; coordinate & integrate software developed by others into coherant working system. No experience required. Must have a MS in Computer Science & and 1 graduate level course each in C programming language. Implementing data communications (network) protocols, UNIX(R) operating systems, and Real time programming. Must have written one program in UNIX(R) and C for software development of Multi window craft Interface and Curses package tool or Dialogue Management Editor (DME) package tool. 40 hrs/wk, $33,000.00/yr. Qualified applicants reply immediately with resume to R. Lechler, JO#3025364, Ohio Bureau of Employment Services, P.O. Box 1618, Columbus, Ohio 43216.

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Salary: $25,566 Min. Liberal Benefits

Application Instruction: Submit two (2) copies of resume, academic credentials and three (3) letters of reference to: Human Resources, 11011 S.W. 104 St., Miami, FL 33176. **APPLICATION DEADLINE:** Must Be Received By February 19, 1988.

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SYSTEMS ENGINEER

Development of real-time software; namely call processing, distributed DBMS etc. for a switching network that has reconfigurable switching modules. The softwere development environment is UNIX/C on mainframe computers and microcomputers. Position involves use of deta communications & computer network functions and support tools like real-time UNIX RTR, ODIN and SDL on different computer architectures. Experience not required but candidate must heve a Master's Degree in Computer Science and graduete study must include e project in the implementation and testing of real-time Communication Protocols on e Reconfigurable Network (Letter of confirmation from School Instructor will be ecceptable). Graduate study must include e course in Comparative Computer Architecture and e course in Microcomputers. Salary offered $3,083.33 per/mo., 40 hrs per/wk, 8 AM to 5 PM, M-F. Send resume to Illinois Department of Employment Security, 401 S. State St - 3S, Chicago IL 60605. Att: Mrs. S. Chalem, Ref. #7705-S. An Emplyr Pd Ad.

PROGRAMMER ANALYSTS

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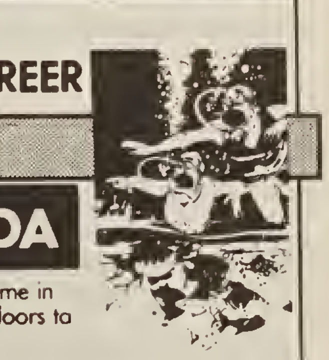

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Beginning January 11, 1988, if you are one of the candidates to receive an offer and join us as a salaried employee before April 15th, you and your spouse or guest will be invited to ottend our all-expense paid weekend Orientation for New Employees to be conducted in Bermuda in May.

Qualified candidates include **Programmer Analysts** through **Systems Analysts** with a minimum of 3 years corporate or consulting experience. Background should include IBM or DEC experience, with on-line, database, or 4GL skills preferred. Constell is seeking all skills, but has immediate requirements for the following:

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- IDMS/ADSO
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MARKETPLACE

Rumors stir market madness

Archaic automation methods end up costing industry time, money

BY ELIZABETH LOZANO
BOSTON COMPUTER EXCHANGE CORP.

Trading volume and profits were down the week ending Jan. 15, as rumors of quantity transactions fueled a general confusion in the marketplace. One issue, however, has become quite clear. The industry that all others depend on for automation has not truly automated itself.

Without a doubt, the National Association of Securities Dealers Automated Quotation System, commonly known as NASDAQ, has its inefficiencies, but the computer industry's methods and protocols for transacting equipment are archaic as well. If you have something to buy or sell, you get on the phone and call everyone you know.

"This 'shout net' method is highly inefficient, and it costs us all a lot of money," one reseller stated. "It's time we set up a live, on-line trading system," he added.

Too many brokers

"The market is like a dog chasing its own tail. We put out feelers for equipment we want, and a few hours later, requests for the same gear come in from brokers who have been called by their broker friends, only the price gets crazy from all the layers of brokers.

"The market has too many brokers trying to make a deal when they are not in direct contact with the buyer or the seller. It's agony trying to sift the real deals from the phony stuff," the reseller lamented.

IBM models closed up across the board after vaporware sales drove some prices through the ceiling.

The IBM PC Model 076 closed up, at $750, with users scrambling for available units and dealers chasing 2,400 off-lease Personal Computers. The PC XT Model 086 closed up $50, at $1,350, with an increase in demand midweek. The Model 089 closed up $25, at $1,875, despite rumors of 100 brand-new units available.

The AT models were the most affected by vaporware conditions. The Model 099 closed up, at $2,300, while the Model 339 jumped to $3,625.

While one successful reseller smiled and said, "Computers were meant to be sold, not used," another dealer complained about market inefficiency and having to chase down a lot of excess-inventory AT Model 339s for about the last three months.

Compaq Computer Corp. trading was flavored more by real transactions than rumors for the week. The Portable I held steady at $700 with few transactions. The Portable II closed up marginally, at $1,725. The Portable III was in high demand, closing at $2,650, with irregular supply spurring dramatic price fluctuations.

Compaq Deskpro trading volume was down for the week ended Jan. 15.

Both the Deskpro 286 and Deskpro 386 held steady, at $2,175 and $4,375, respectively, as users put off purchasing decisions in the face of a shortage in supply of the machines and high asking prices.

Mac business

Apple Computer, Inc. computers seem to be taking the microcomputing world by storm. Soaring demand coupled with heavy street price discounting made for an interesting week for the Macintosh.

The Mac 512 closed even at $850, with its value being supported by excess demand for Mac 512E and Mac Plus units. However, the Mac 512E closed even, at $1,000, with outstanding buy orders for quantities of 25 units or higher dominating across the board.

The used Mac Plus closed even at $1,300, with new discount prices holding that number from climbing any higher.

Used Mac SE and Mac II models were in high demand the week of Jan 11. Tight supply conditions, however, forced most buyers to purchase new equipment instead. The Mac SE closed at $1,925 and the Mac II closed at $4,000.

Used Imagewriter I and IIs experienced high demand the week of Jan. 11 as well.

The Boston Computer Exchange can be reached at 800-BOCOEXX, or 617-542-4414 in Massachusetts.

The BoCoEx Index

Closing prices report for the week ending Jan. 15, 1988

	Closing price	Recent high	Recent low
IBM PC Model 076	$750	$900	$350
XT Model 086	$1,350	$1,425	$800
XT Model 089	$1,875	$2,050	$1,000
AT Model 099	$2,300	$2,900	$1,950
AT Model 339	$3,625	$3,700	$2,400
Compaq Portable I	$700	$975	$600
Portable II	$1,725	$1,900	$1,475
Portable III	$2,650	$3,000	$2,175
Plus	$1,275	$1,300	$975
Deskpro 286	$2,175	$2,500	$2,050
Deskpro 386	$4,375	$4,600	$4,000
Macintosh 512	$850	$875	$650
512E	$1,000	$1,100	$800
Plus	$1,300	$1,375	$950
SE	$1,925	$2,150	$1,700
II	$4,000	$4,200	$3,500
DEC Rainbow 100+	$1,050	$1,300	$600
Hewlett-Packard Laserjet	$900	$950	$500
Wang PC	$850	$1,000	$400
AT&T PC 6300	$800	$1,050	$650

INFORMATION PROVIDED BY THE BOSTON COMPUTER EXCHANGE CORP.

Silverlake anticipation slows System/36 activity

BY TONY MEMBRINO
IDC FINANCIAL SERVICES CORP.

According to most dealers, secondary market activity for the IBM System/36 has been somewhat slow, as overall supply is abundant and demand is sluggish. This is in contrast to a fairly active fourth-quarter market.

It appears that some users are waiting to see how much Silverlake, IBM's System/36 and 38 convergence, will affect them before making any decisions.

Silverlake, which is expected to be announced sometime this year, has a performance range that will overlap the IBM 5360 and possibly touch the IBM 5362, making it a machine 50% to 75% more powerful than the System/38 Model 70.

Activity currently taking place in the System/36 used market is focused mainly on the 5360 Models B and D.

Model B values have begun to decline. In November, a 5360 Model B23 Stage 1 could be purchased at retail for 48% of list, or $19,488. Current quotes indicate a drop to 38% of list price, or $15,428. Similarly, the B24 Stage 1 has traded for 55% of retail, or $30,305. It is now trading at 46%, or $25,346.

IBM mainframes

Current fair retail market value

	Date shipped	MIPS[1]	List price	Percent of market value
3083 Model J	1Q 1983	7.5	$2,625,731	12
3081 Model K	2Q 1982	13.5	$3,940,731	13
3084 Model Q	4Q 1983	24.3	$6,091,462	18
3090 Model 200	August 1985	27.2	$4,584,900	73

[1] Millions of instructions per second

INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHART

While the inexpensive upgrades from Model B to Model D have kept B values steady in the past, delays on these upgrades have coerced users to swap out their existing Model Bs and purchase Model Ds outright.

This transition is no doubt warmly welcomed by IBM, which would prefer that users move into the high-end machines. As a result of this swapping, a great supply of Model Bs exists on the used market with little demand, contributing to lower B values.

Model D24 values have held strong. The 5360 Model D24 is currently available new from third-party market dealers as a result of the value-added reseller network, which precipitates equipment appearing earlier than normal and at lower prices. This trend is expected to continue for the near term for the B and D models.

Unexplained delays

As far as the new 5363 model is concerned, delays of four to six weeks have been reported.

Third-party contacts of International Data Corp. (IDC) have been unable to explain these long lead times but have indicated that there is a strong interest in the 5363. These delays have kept 5364 models relatively scarce on the used market.

Analysts at IDC say as soon as the 5363 ships regularly, 5364 values will begin to drop quickly to reflect the performance difference between the 5363 and 5364, the additional cost for a personal computer required with a 5364, the greater disk capacity offered on the 5363 and some new-vs.-used factors.

In direct contrast to the System/36 used market, the System/38 secondary market has been experiencing brisk trading. This activity seems somewhat contradictory, as Silverlake's expected April announcement is supposed to answer System/38 users' dire need for more power and memory. However, IBM has enticed many users to continue buying System/38 models with its October announcement, which reduced prices on many System/38 models.

Overall supply has tightened as a result of increased activities in upgrading. Used dealers have seen new high-end machine purchases and upgrades to the high end. This activity has caused prices to stabilize and, in many cases, increased values for the older System/38 models.

Meanwhile, as sales have increased, the higher end System/38 600 and 700 series have held their values on the retail market. Current trades have them listed at 72% of list. Dealers are expecting stability in used pricing for the short term, mainly with the new line, and an eventual drop-off in the older line as the machines are displaced for Silverlake.

For more information, call IDC's Terri LeBlanc at (617) 872-8200.

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Request for Proposal No. 1304, due Monday, February 8, 1988 at 3:30 p.m. for the acquisition of a high-speed, heavy-duty, production laser printer capable of functioning in both standalone and networked modes within an SNA environment. Charge $10.00.

Request for Proposal No. 1305, due Monday, February 8, 1988 at 3:30 p.m. for the upgrade of a Honeywell DPS 6/45 computer system for the STATE OIL AND GAS BOARD. Charge $10.00

Detailed specifications may be obtained free of charge from the CDPA office or at the specified cost by submitting a written request accompanied by the appropriate payment. **NOTE: Valid forms of payment are corporate check on a Mississippi bank, certified check or POSTAL money order. NO CASH OR OUT-OF-STATE CHECKS.** The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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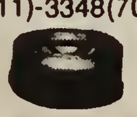

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S/38-300	0.58	6 to 8
S/38-400	0.75	6 to 8
4341-1	0.88	2 to 4
S/38-600	0.98	8 to 16
S/38-700	1.1	16 to 32
•9375-60	1.2	8 to 16
4381-11	1.4	4 to 16
4361-5	1.45	2 to 12
4341-2	1.5	2 to 16
4341-12	1.65	2 to 16
†4381-21	1.9	8 to 16
4381-1	2.1	4 to 16
•9377-90	2.5	8 to 16
4381-2	2.7	4 to 32
4381-12	2.7	8 to 32
†4381-22	3.2	16 to 32
4381-13	3.6	8 to 32
3083EX	4.4	8 to 32
4381-3	4.5	8 to 32
†4381-23	4.7	16 to 64

SYSTEMS	MIPS (Millions of Instructions Processed Per Second)	MEGABYTES
3033-UP	5.0	4 to 24
4381-14	6.0	16 to 32
3083BX	6.6	8 to 32
•3090-120E	7.5	32 to 128
†4381-24	7.8	16 to 64
3083JX	8.8	8 to 32
3090-150	9.2	32 to 64
3081D	10.0	16 to 32
•3090-150E	10.0	32 to 64
3081 GX	11.9	16 to 64
3090-180	15.4	32 to 64
3081KX	15.5	16 to 64
•3090-180E	17.6	32 to 64
3090-200	27.7	64 to 128
3084QX	28.7	32 to 128
•3090-200E	31.9	64 to 128
•3090-300E	44.3	64 to 128
3090-400	50.0	128 to 256
•3090-400E	56.0	128 to 256
•3090-600E	76.0	128 to 256

• First Installation 1987
† First Installation 1st Qtr 1988

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SYSTEMS	MIPS	MEGABYTES
5840	8.4	16 to 128
5850	11.6	16 to 128
5860	14.0	16 to 128
5867	22.0	24 to 128
5868	22.0	32 to 256
5870	26.6	32 to 128
5880	26.6	32 to 256
•5890-190E	22	64 to 256
•5890-200E	31	64 to 256
•5890-300E	40	64 to 256
•5890-400E	58	128 to 512
•5890-600E	67	128 to 512

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SYSTEMS	MIPS	MEGABYTES
AS 9060	11	16 to 64
ASXL-50	15	32 to 64
AS 9070	16	16 to 64
AS 9080	20	16 to 64
AS XL-60	28	64 to 256
AS XL-80	50	64 to 256
•AS XL-90	67	128 to 512
•AS XL-100	80	128 to 512

The above information is intended as a guideline for computer users on relative computer systems instruction cycle times. All data have been derived from published documentation and represent reasonable estimates of average MIPS ratings. However, Randolph is not responsible for the accuracy of the MIPS data. Cycle times will vary based on hardware software configurations and system manufacturers continually modify computer models as design improvements in hardware and software arise.

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Issue Date	Closing Date	Topic	Show Distribution
Jan. 6*	Dec. 4	Communications/ Connectivity	Communication Networks
Feb. 3	Dec. 31	Software Operating Systems & Languages	Uniforum
Mar. 2*	Jan. 29	Departmental Computing	NCGA/Interface/ WCC
Apr. 6	Mar. 4	Data Security	
May 4	Apr. 1	Communications/ Connectivity	Comdex Spring/ ICA
June 1*	Apr. 29	PC End User Productivity	PC Expo
July 6	June 3	Software	
Aug. 3	July 1	Departmental Computing	
Sept. 7	Aug. 5	Communications	TCA
Oct. 5	Sept. 2	Software Productivity	Unix Expo/Info '88/ Dexpo West
Nov. 2	Sept. 30	PC/Connectivity	Comdex Fall
Dec. 7	Nov. 4	Departmental Computing	

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ADVERTISERS INDEX

AI/West '88 29
Amdahl DASD 43
AT&T....... 38-39

Benchmark Technical Services ...16
B.I. Moyle & Associates.......25
Bridge Communications Inc.......S4
Business Recovery Systems.......76
Businessland....... 32-33

Cahners Exposition Group 73
Case Communications.......55
Chicago Soft.......14
Cincom Systems.......49
Communication Networks.......72
Compudata Services.......15
Compuserve.......62
Computer Associates 22,60
Computer Technology Group.......63
Corvus Systems.......SC3
CW Circulation 53
CW Focus.......97

Data Design Associates.......24
Data General 31
Data Group.......48
Data Interface Systems Corp. S3
Digital Equipment Corp. 26-27

Exide Electronics.......54

GE Consulting Services 76

Hayes Microcomputing.......74
Hewlett Packard.......60/61
Honeywell Bull....... 40-41

IBM 46-47,58-59
Information Builders 28
Informix.......80
Innovation Data Processing.......5
Interface Systems 66

JDS Microprocessing.......42

KMW Systems 51

Micro Focus 35
Morino Associates.......17
MSA.......C4
Multi-Tech Systems 45

National Datacomputer.......30
NEC.......50,C3
Network Equipment
Technologies....... S6-S7
Northern Telecom....... 56-57
Novell....... S9-S11
Nynex.......52

On-Line Software 23
Oracle 11

PC's Limited 68-69
Prime Computer 36
Process Integrity 44

Qualstar 59
Quantus.......SC4

Realia.......71
Relational Technology.......S8

SAS Institute....... 12-13,34
Software Engineering of America..9
Sorbus.......28/29,77
Stratus Computer....... 78-79
Sun Microsystems....... 20-21
Syncsort 3

Televideo 70
3Com SC2

USA Today.......S5

VM Software 7

Xerox 64-65

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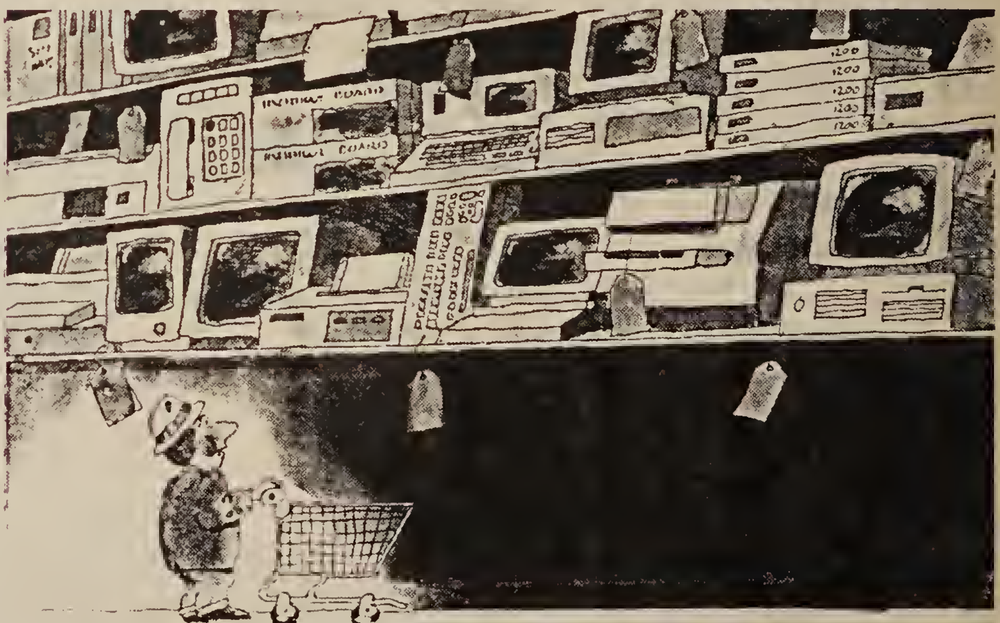

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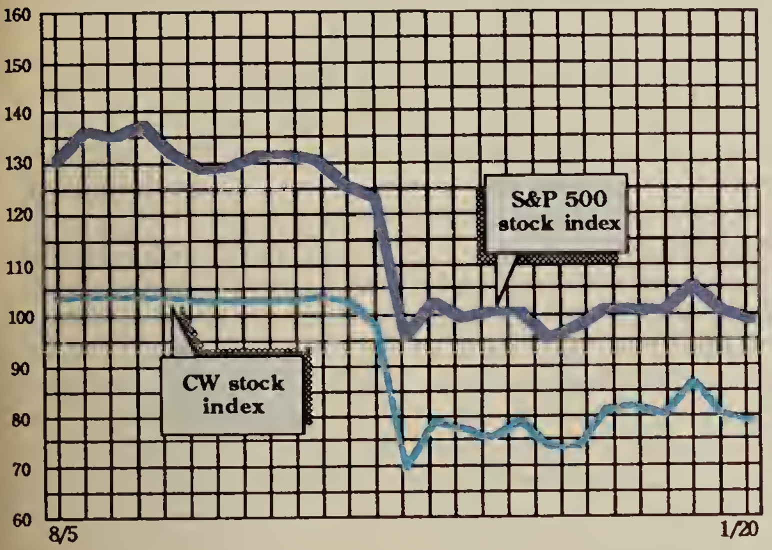
Issue Date	Topic	Ad Closing Date
Feb. 29	Performance Management/ Capacity Planning	Feb. 12
March 14	DBMS	Feb. 26
March 28	Micro-to-Host-Links	March 11
April 11	PCs (IBM-Compatible) Portables/Laptops	March 28
April 25	TBA	April 8
May 9	Printers	April 22
May 23	Data Communications	May 6
June 6	CASE	May 20
June 20	The SNA Market	June 3
July 11	Disaster Prevention & Recovery Products & Services	June 24
July 25	Productivity Software	July 8

STOCK TRADING INDEX



Indexes	*Last Week*	*This Week*
Communications	85.0	**84.2**
Computer Systems	89.1	**87.9**
Software & DP Services	93.0	**91.6**
Semiconductors	57.1	**54.3**
Peripherals & Subsystems	82.2	**80.8**
Leasing Companies	101.1	**100.8**
Composite Index	80.2	**78.8**
S&P 500 Index	100.2	**98.9**

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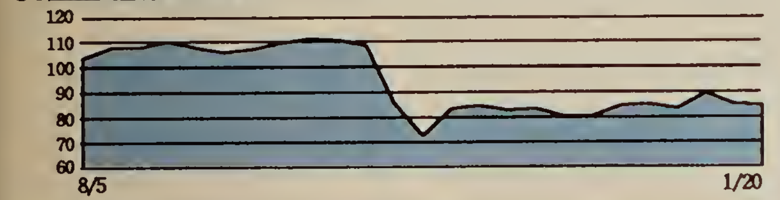

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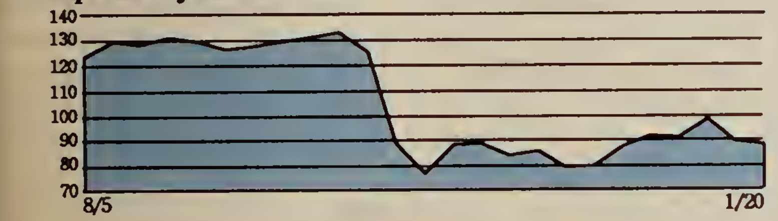

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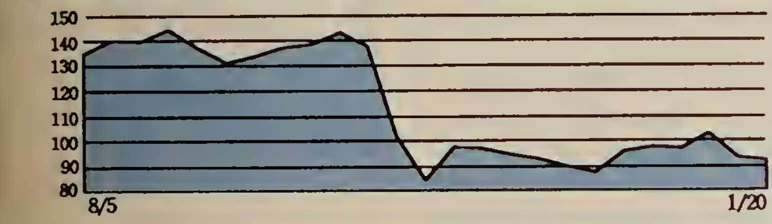

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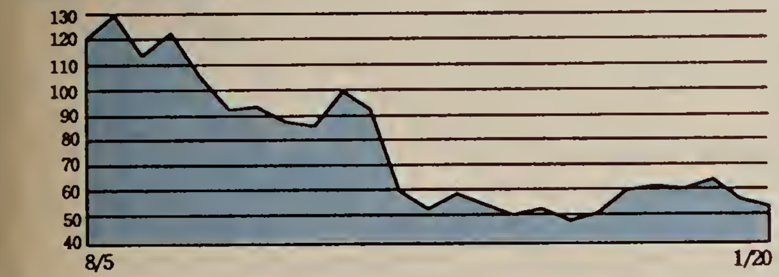

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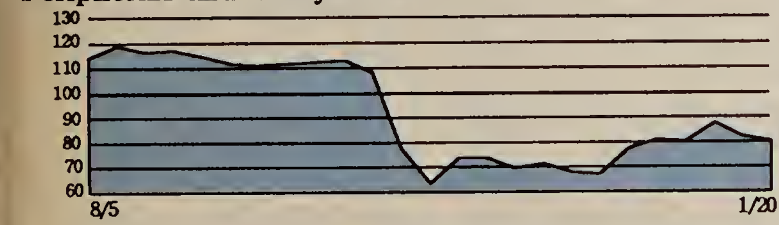

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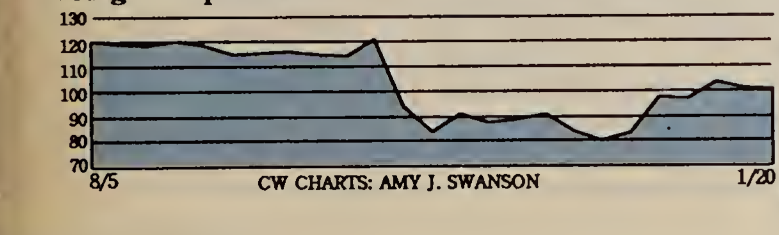

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Q	ANDREW CORP	19	11	13.1	0.1	1.0
Q	ARTEL CDMM CORP	5	2	1.9	-0.3	-11.8
N	AT&T	36	20	2B.0	0.0	0.0
Q	AVANT GARDE COMP INC	6	2	2.1	-0.1	-5.6
Q	AVANTEK INC	19	7	6.6	-0.5	-7.0
N	AYDIN CORP	38	16	19.3	0.4	2.0
N	BELL ATLANTIC CORP	80	61	65.9	-0.9	-1.3
N	BELLSOUTH CORP	44	29	37.4	0.1	0.3
Q	CDMPRESSION LABS INC	8	2	3.3	0.1	4.0
O	COMPUTER NETWORK TECH	6	2	2.0	0.0	0.0
D	CONTEL CORP	40	25	31.4	0.8	2.4
Q	DATA SWITCH CORP	9	4	6.0	-0.4	-5.9
Q	DIGITAL CDMM ASSOC	49	20	27.0	-2.0	-6.9
Q	DYNATECH CORP	44	14	19.0	-0.8	-3.8
Q	FIBRONICS INTERNATIONAL INC	11	2	2.5	-0.1	-4.8
Q	GANDALF TECHNOLOGIES	11	5	6.0	-0.1	-2.0
Q	GENERAL DATACDMM INDS	14	3	4.1	0.1	3.1
N	GTE CORP	45	29	35.5	0.9	2.5
Q	INFDTRDN SYS CORP	12	5	6.5	-0.3	-3.7
N	ITT CORP	66	42	46.0	1.9	4.2
N	M A CDM INC	16	7	9.8	0.0	0.0
Q	MCI CDMMUNICATIONS CORP	12	5	1D.4	D.0	D.0
Q	MICOM SYS INC	18	7	9.6	1.4	16.7
Q	NETWORK SYS CORP	19	7	7.4	-1.3	-14.5
N	NORTHERN TELECOM LTD	24	14	17.9	-0.3	-1.4
Q	NOVELL INC	30	12	21.3	-0.3	-1.2
N	NYNEX CORP	78	58	65.1	0.9	1.4
N	PACIFIC TELESIS GROUP	34	9	26.5	-0.1	-0.5
N	PARADYNE CORP	9	4	3.9	0.1	3.3
A	PENRIL CORP	6	1	3.5	0.3	7.7
N	PLESSEY PLC	41	23	28.5	0.1	D.4
N	SCIENTIFIC ATLANTA INC	20	8	11.6	0.4	3.3
N	SOUTHWESTERN BELL CORP	46	22	35.1	0.0	0.0
Q	3 COM CORP	26	12	18.5	-0.4	-2.0
N	TIMEPLEX INC	41	17	30.8	-1.5	-4.7
Q	UNGERMANN BASS INC	16	5	7.1	-0.3	-3.4
N	U S WEST INC	60	43	49.8	-0.6	-1.2

Computer Systems

EXCH		52-WEEK RANGE (1)		PRICE CLOSE JAN. 20 1988	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLIANT COMPUTER SYS	37	5	7.5	0.3	3.4
Q	ALPHA MICROSYSTEMS	6	3	4.4	0.0	0.0
Q	ALTDS COMPUTER SYS	17	9	10.8	-0.1	-1.1
A	AMDAHL CORP	50	19	29.5	-2.4	-7.5
Q	APOLLD CDMPUTER INC	25	9	11.4	-0.4	-3.2
Q	APPLE COMPUTER INC	60	24	39.8	-2.5	-5.9
N	BOLT BERANEK & NEWMAN	30	12	16.3	-0.6	-3.7
Q	BRITTON LEE INC	5	1	1.5	D.1	9.1
N	CDMPAQ COMPUTER CORP	79	23	45.4	-7.5	-14.2
Q	CDMPUTER AUTDMATION INC	17	5	10.4	2.0	23.9
A	CDMPUTER CONSOLES INC	12	2	4.9	0.0	0.0
Q	CONCURRENT COMP CORP	24	11	16.5	0.0	0.0
N	CONTRDL DATA CORP DEL	38	18	2D.4	0.5	2.5
Q	CONVERGENT TECH	12	3	3.3	-0.6	-16.1
Q	CONVEX COMPUTER CORP	22	6	7.8	-0.1	-1.6
N	CRAY RESH INC	136	47	65.6	-6.6	-9.2
Q	DAISY SYS CORP	13	5	6.8	0.0	0.0
N	DATA GEN CORP	39	16	23.5	-1.6	-6.5
N	DATAPOINT CORP	9	3	4.3	-0.1	-2.9
N	DIGITAL EQUIP CORP	200	110	115.5	-7.3	-5.9
N	FLOATING POINT SYS INC	17	3	3.9	D.0	0.D
N	GOULD INC	34	8	12.5	-0.4	-2.9
N	HARRIS CORP	43	22	25.B	-0.1	-0.5
N	HEWLETT PACKARD CD	74	36	52.4	-2.1	-3.9
N	HONEYWELL INC	91	49	57.3	D.5	0.9
N	IBM	176	102	11D.4	-5.8	-5.0
Q	INFORMATION INTL INC	17	9	10.8	0.6	6.2
Q	IPL SYS INC	3	2	1.6	-0.1	-7.1
Q	MASS CDMPUTER CORP	14	5	5.4	-0.3	-4.4
N	MATSUSHITA ELEC INDL LTD	196	93	176.6	1.1	0.6
Q	MEGADATA CORP	7	3	3.4	-0.1	-3.6
Q	MENTOR GRAPHICS CORP	39	14	19.8	-1.0	-4.8
N	NBI INC	14	4	3.6	-0.1	-3.3
N	NCR CORP	87	50	54.4	-5.9	-9.8
N	PRIME CDMPUTER INC	31	12	14.5	-0.5	-3.3
Q	PYRAMID TECHNDLOGY	12	5	8.5	D.8	9.7
Q	STRATUS CDMPUTER	41	15	20.5	-2.3	-9.9
Q	SUN MICRDSYSTEM INC	46	14	32.8	-3.6	-10.0
Q	SYMBDLICS INC	6	1	1.6	0.4	36.8
N	TANDEM COMPUTERS INC	38	18	19.0	-1.3	-6.2
N	TANDY CORP	57	28	33.6	0.1	0.4
N	ULTIMATE CORP	37	16	15.9	-0.3	-1.6
N	UNISYS CORP	48	24	30.8	-1.8	-5.4
A	WANG LABS INC	19	10	13.8	0.5	3.8

Software & DP Services

EXCH		52-WEEK RANGE (1)		PRICE CLOSE JAN. 20 1988	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ADVANCED COMP TECH	6	1	1.6	-0.3	-13.3
N	AGS COMPUTERS INC	30	11	15.4	-0.9	-5.4
Q	AMERICAN MGMT SYS INC	20	9	13.1	D.8	6.1
Q	AMERICAN SDFTWARE INC	22	6	9.8	0.5	5.4
N	ANACOMP INC	11	4	6.6	-0.4	-5.4
Q	ANALYSTS INTL CORP	1D	4	7.3	-D.3	-3.3
Q	ASHTDN TATE	33	13	23.0	-1.B	-7.1
Q	ASK CDMPUTER SYS INC	17	6	7.5	0.3	3.4
Q	AUTODESK INC	34	12	16.8	-2.5	-13.0
N	AUTD DATA PROCESSING	55	16	40.0	1.1	2.9
Q	BOOLE & BABBAGE INC	12	5	8.D	0.0	0.0
N	COMPUTER ASSOC INTL INC	37	15	27.3	-1.0	-3.5
Q	COMPUTER HORIZDNS CORP	15	7	10.0	0.4	3.9
N	COMPUTER SCIENCES CORP	73	42	46.0	-1.5	-3.2
N	CDMPUTER TASK GRDUP INC	18	9	10.4	-D.4	-3.5
Q	CDMSHARE INC	28	12	15.5	2.8	21.6
N	CULLINET SDFTWARE INC	14	4	5.9	-0.9	-13.0
Q	CYCARE SYS INC	10	6	6.8	0.6	10.2
Q	DUQUESNE SYS INC	33	10	19.0	1.0	5.6
A	DATA ARCHITECTS INC	17	7	8.9	-0.1	-1.4
N	GENERAL MTRS (CLS E)	51	28	35.6	1.1	3.3
Q	HOGAN SYS INC	17	5	4.9	-0.3	-4.9
Q	INFDRMIX CORP	31	11	19.5	-1.3	-6.0
Q	INTELLICORP INC	11	2	2.9	-D.6	-17.9
Q	KEANE INC	1D	6	7.0	0.0	0.0
Q	LDTUS DEV CORP	40	19	26.8	-1.3	-4.5
Q	MANAGEMENT SCI AMER	21	6	6.0	-0.1	-2.D
Q	MICRD PRD INTL CORP	8	3	3.5	-0.1	-1.8
Q	MICRDSOFT CORP	79	32	54.D	-2.8	-4.8
Q	MORIND ASSOCIATES INC	24	7	14.0	0.5	3.7
Q	NATIONAL DATA CORP	34	19	25.5	-0.8	-2.9
Q	DN LINE SDFTWARE INTL INC	22	9	10.8	-0.6	-5.5
Q	DRACLE SYS CORP	19	6	11.8	-1.5	-11.3
N	PANSDPHIC SYS INC	28	11	13.1	-0.9	-6.3
Q	POLICY MGMT SYS CORP	30	15	19.5	0.3	1.3
Q	PROGRAMMING & SYS INC	14	7	9.8	1.1	13.0
Q	REYNDLDS & REYNOLDS CD	39	14	17.0	-0.3	-1.4
Q	SEI CDRP	18	10	15.5	D.0	0.0
Q	SHARED MED SYS CORP	53	19	22.3	-0.5	-2.2
Q	SDFTWARE AG SYSTEMS INC	19	8	7.9	0.D	0.0
Q	SDFTWARE PUBG CDRP	17	5	8.8	-0.3	-2.8
A	STERLING SOFTWARE INC	14	6	6.6	0.4	6.0
Q	SUNGARD DATA SYS INC	21	10	13.8	0.0	0.0
Q	SYSTEMATICS INC	30	19	25.3	0.0	D.0
N	SYS. SDFT INC.	24	7	13.3	0.0	0.0
Q	VM SOFTWARE INC	45	7	7.5	-0.5	-6.3

Semiconductors

EXCH		52-WEEK RANGE (1)		PRICE CLOSE JAN. 20 1988	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADV MICRD DEVICES INC	25	8	8.9	-0.6	-6.6
N	ANALDG DEVICES INC	24	B	11.0	0.0	0.0
Q	ANALOGIC CORP	13	5	6.9	0.6	10.0
Q	INTEL CORP	42	18	22.5	-2.3	-9.1
Q	LSI LOGIC CORP	17	7	8.6	-0.6	-6.8
N	MDTOROLA INC	74	35	40.9	-5.0	-10.9
N	NATL SEMICDNDUCTOR	22	10	10.0	-0.9	-B.0
N	TEXAS INSTRS INC	80	36	44.4	-5.4	-10.B
A	WESTERN DIGITAL CORP	33	12	12.0	-1.0	-7.7

Peripherals

EXCH		52-WEEK RANGE (1)		PRICE CLOSE JAN. 20 1988	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLOY CDMP.	13	4	4.1	-0.1	-2.9
N	AM INTL INC	9	3	5.3	-0.4	-6.7
Q	AST RESH INC	23	6	8.5	0.1	1.5
Q	AUTO TROL TECH CORP	9	3	3.3	0.0	0.0
Q	BANCTEC INC	16	5	7.1	-0.3	-3.4
Q	CIPHER DATA PRDDS INC	18	4	6.5	0.1	2.0
A	CDGNITRDNICS CORP	5	2	2.9	-0.4	-11.5
N	CDMPUGRAPHIC CORP	28	19	22.3	0.1	0.6
N	CDMPUTERVISION CORP	23	7	14.8	-0.1	-0.B
A	DATAPRDDUCTS CORP	24	7	7.9	0.1	1.6
A	DATARAM CORP	9	5	6.0	-D.4	-5.9
N	DECISION INDS CORP	13	4	10.6	-0.1	-1.2
N	EASTMAN KODAK CD	71	42	48.5	-0.5	-1.0
Q	E M C CORP MASS	29	10	12.B	-1.B	-12.1
Q	EMULEX CORP	9	4	5.9	0.0	0.D
Q	EVANS & SUTHERLAND	40	1B	19.5	-1.0	-4.9
Q	ICDT CORP	13	3	4.5	0.4	9.1
Q	INTERLEAF INC	24	9	15.6	-0.6	-3.8
Q	IDMEGA CORP	8	1	2.6	-0.1	-4.5
Q	LEE DATA CORP	10	3	2.9	-0.1	-4.2
Q	MASSTOR SYS CORP	6	1	2.0	0.1	3.2
Q	MAXTOR CORP	34	6	9.8	-0.4	-3.7
Q	MICROPOLIS CORP	44	13	18.5	-2.8	-12.9
Q	MINISCRIBE CORP	18	5	7.8	-0.6	-7.5
N	MINNESOTA MNG & MFG CD	84	45	57.D	-3.8	-6.2
A	MSI DATA CORP	24	12	20.4	1.8	9.4
Q	PRIAM CORP	6	1	1.6	-0.1	-7.1
Q	PRINTRONIX INC	13	7	7.8	D.4	5.1
N	QMS INC	27	1D	10.0	D.3	2.6
Q	QUANTUM CORP	35	8	10.8	0.5	4.9
Q	RAMTEK CORP	6	2	4.3	0.5	13.3
N	RECOGNITION EQUIP INC	27	7	9.8	0.3	2.6
Q	REXON INC	14	5	5.8	-0.1	-2.1
Q	SCAN TRON CORP	17	7	10.5	-0.3	-2.3
Q	SEAGATE TECHNDLOGY	46	10	16.1	-0.1	-0.8
N	STORAGE TECH CORP	5	1	1.8	-0.1	-6.7
Q	TANDON CORP	7	2	1.6	-0.3	-13.3
A	TEC INC	7	3	5.4	0.4	7.5
N	TEKTRONIX INC	43	21	23.3	-1.1	-4.6
Q	TELEVIDED SYS INC	3	1	1.4	0.1	4.6
N	TELEX CORP	102	30	58.5	0.9	1.5
Q	WYSE TECH	40	11	19.9	-2.1	-9.7
N	XERDX CORP	85	50	55.9	-1.9	-3.2
Q	XIDEX CORP	16	6	6.6	0.0	0.0

Leasing Companies

EXCH		52-WEEK RANGE (1)		PRICE CLOSE JAN. 20 1988	WEEK NET CHNGE	WEEK PCT CHNGE
Q	CAPITAL ASSOCIATES INTERNATIONAL INC	11	4	3.8	-0.3	-6.3
N	COMDISCD INC	37	12	17.8	0.5	2.9
N	CONTINENTAL INFD SYS	14	5	6.5	0.0	0.0
Q	PHDENIX AMERN INC	8	2	2.8	-0.1	-4.3
Q	SELECTERM INC	6	3	4.3	0.3	6.3

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL;
O = OVER-THE-COUNTER; S = SPLIT

O-T-C PRICES ARE BID PRICES AS DF 3 P.M. OR LAST BID
(1) TD NEAREST DOLLAR

Fault line

Crack in IBM revenue growth sends tremors through tech

Aftershocks from the Oct. 19 crash appeared to shake the stock market last week, and computer stocks bore the brunt of the reaction. Despite strong fourth-quarter earnings performances from most major vendors, the market concluded that slow revenue growth by IBM was the sign of an impending computer slump and drove down share prices across the high-tech board.

The massive sell-off moderated late in the week, but few vendors were able to recoup. IBM, which plunged 6 points Tuesday after announcing fourth-quarter results, was trading late Friday at 109¾, down 9¼ points for the week. Digital Equipment Corp. was up ⅞ of a point for the week to 119⅞, Unisys Corp. was off 2⅛ points to 32¼, and Hewlett-Packard Co. was down 3⅝ points to 53⅜. Apple Computer, Inc. was down 4⅜ points to 38½; Compaq Computer Corp. lost 6⅜ points to 52⅞. On the American Stock Exchange, Sterling Software, Inc. jumped 2⅛ points Thursday to 8¾ after it revealed a possible leveraged buy-out for $9 to $10 per share, while Computer Consoles, Inc. shot up 1⅛ points to 6 the same day in anticipation of its first profitable year since 1984.

CLINTON WILDER

Speculation puts Comdisco into red ink

BY JEAN S. BOZMAN
CW STAFF

CHICAGO — Leasing giant Comdisco, Inc.'s misadventure in stock speculation caused the $1.2 billion company last week to post a $100 million pretax loss.

At the firm's annual meeting late last week, Comdisco executives said the decision to withdraw from the business of arbitrage — the practice of speculating on stocks of companies believed to be takeover targets — resulted in an after-tax loss of $80 million for the first quarter ended Dec. 31, 1987. That wiped out the company's record profits of $24 million from other operations and resulted in a net loss of $53 million.

The Oct. 19 stock market crash wiped out much of the value of the stocks acquired by Comdisco's arbitrage unit; the company said it has sold 85% of those stocks and expects to sell the remainder by the end of March.

Unanticipated loss

The red ink on the bottom line belied a fundamentally strong core business of computer leasing and disaster recovery services. Total revenue jumped 22% to $327 million for the quarter.

"We did not anticipate such dramatic volatility in the market," Comdisco Chairman and President Ken Pontikes explained in answer to a stockholder's question about the risk arbitrage loss. "It was very traumatic, but we have shown that the company is very sound, the business is very sound, our finances are very sound, and we think the future looks very bright."

Comdisco still holds $45 million in securities, which it is trying to sell at favorable prices, Pontikes said. "We wanted to make an orderly retreat," he said, "and there's a chance we will get some recovery from it."

Shareholders questioned later agreed that Pontikes and other Comdisco executives had made a compelling argument that the firm would quickly recover from the loss — which amounted to $1.34 per share, compared with 57 cents a share derived from the core business.

The company plans to boost earnings by remarketing used computers as they come off lease, generating $580 million in revenue in the next five years.

"We've created a bow wave that pushes a substantial part of our earnings out into the future," said John Vosicky, Comdisco's chief financial officer.

Comdisco also plans to accelerate its leasing of non-IBM equipment. "This year, we are shooting for $1 billion in our non-IBM portfolio," said Bob Bardagy, executive vice-president of marketing. "We haven't left the IBM arena, but its growth will stay relatively constant, and we're looking to new equipment for growth."

The diversification includes the acquisition of computers from Tandem Computers, Inc., Digital Equipment Corp., Data General Corp., AT&T and NCR Corp. Bardagy said the non-IBM business was highly profitable, "since we are doing the financing as soon as we take the computer out of the box." Comdisco moves many IBM mainframes for which it did not provide original financing.

A second growth area is hot-site recovery services provided by the firm's Comdisco Disaster Recovery Services, Inc. subsidiary. The service already has 800 customers, each paying a minimum of $5,000 a month.

Comdisco Disaster Recovery Services maintains 14 hot sites in North America. But this year, operations are expected to go overseas, with the addition of centers in Europe.

Stratus ups entry-level power with pair of systems

BY STANLEY GIBSON
CW STAFF

BOSTON — Adding entry-level models to its year-old XA2000 line, Stratus Computer, Inc. last week announced a pair of systems, each priced near $100,000.

The processors, the Models 50 and 70, offer twice the performance of Stratus's previous entry-level system, the FT-250, at a 35% lower price, the vendor claimed.

The Model 50 can perform 10 transactions per second, according to the ET-1 benchmark, and the Model 70 is capable of up to 12 transactions per second, according to the same yardstick.

The products are compatible with existing XA2000 models and run software written for those systems without changes, the vendor said.

Stratus President William Foster said he expects sales of the systems to be made in large quantities to major corporations rather than in single units to small businesses.

Dave Moschella, an analyst with International Data Corp., a market research firm in Framingham, Mass., concurred with that assessment. "It's a real positive announcement. There will be a lot of orders for five to 50 processors," he said.

Subsystem for adapters

Stratus also announced IOP, an I/O subsystem that can house a variety of communications adapters. The subsystem is included as standard equipment with the new models and is an option for other XA2000 models. Stratus announced an Ethernet communications adapter for use with IOP.

To support IOP, Stratus also announced Version 8.0 of its Virtual Operating System. In addition, the company announced disk drives in 152M- and 320M-byte capacities.

The Model 50, with a price tag of $79,000, comes with a ¼-in. cartridge tape drive, duplexed 8M bytes of memory, the IOP susbystem, duplexed 152M-byte disk drives, an operating system and transaction processing software.

The Model 70 is priced at $110,000 in a similar configuration. A third model, the Model 50T, priced at $84,000, is a version of the Model 50 that is upgradable to the Model 70. All the processors are slated to be available in the second quarter of this year; volume deliveries are slated to begin in the third quarter.

Foster said he does not fear Digital Equipment Corp.'s anticipated foray into on-line transaction processing.

Computervision board's fate up to court

BY ROSEMARY HAMILTON
CW STAFF

Prime Computer, Inc. and Computervision Corp. continued their legal fencing last week in the takeover battle Prime launched late last year.

A hearing was held in the Delaware Court of Chancery in Wilmington, Del., Thursday to resolve the dispute surrounding Prime's attempt to gather voting rights from Computervision stockholders.

> IF PRIME achieves a majority of voting rights, it could remove the board of directors.

A decision was expected either late Friday or today. If Prime is able to achieve a majority of voting rights, it could remove the current Computervision board of directors.

Prime also backed off slightly from its challenge of Computervision's severance agreements. The minicomputer company said it will no longer challenge all severance agreements but only those that apply to the top 17 executives of Computervision.

Meanwhile, Computervision claimed last week that Prime did not disclose information relating to a public offering of debentures to its stockholders.

A Prime spokesman said that challenge was reviewed with others that have been made this month and "nothing they've done has made us change our minds."

Server

FROM PAGE 1

While analysts last week questioned whether the deal threatens Ashton-Tate's market dominance, users praised the technology.

"The sharing of information across the network is important," said Jeff Knepper, director of advanced technology tax at Touche Ross in Washington, D.C. "But the real value is insuring the information," as the SQL Server does.

No names mentioned

It is unclear just what contribution Ashton-Tate made to SQL Server. An Ashton-Tate spokeswoman said the company is providing "the necessary technology and expertise to enable existing Dbase applications and future Dbase applications to transparently use the server." Microsoft's SQL Server product manager Dave Kaplan said, "We're not going into the details of who wrote what lines of code. There is clearly a mutual benefit for both of these companies."

Mutual benefit or not, Ashton-Tate has spent much of the last week defending its decision to join forces with Microsoft, denying that the partnership is a sign of its own weakness or a concession to poor proprietary technology.

Charles Hanes, manager of technical consulting at the Lanquest Group in Santa Clara, said the alliance with Microsoft may signal that Ashton-Tate is working with others to avoid falling further behind technologically.

> "DBASE III has taken it in the chops. . . . But I think [SQL Server] is going to give them a leg up."
>
> ALAN LOEBEL
> HARRIS CORP.

Wayne Ratliff, who was chief developer of the original Dbase, said, "It's evident that Ashton-Tate is having more and more trouble with its in-house technology." Ratliff is now president of Ratliff Software Production, Inc.

"Those kinds of claims are absolute trash," said Roy Folk, Ashton-Tate's vice-president of software development. "Sybase had something we could get our hands on immediately, and with the positioning from Microsoft, it allows us to get to market fast."

Ashton-Tate has sold its own networked DBMS, Dbase III Plus Lan Pack, for 15 months. In light of the announcement two weeks ago, that product's future is uncertain. Folk said SQL Server does not supplant it and that a similar file server product will be offered with later releases of Dbase.

Users said the alliance of Ashton-Tate and Microsoft helps position Ashton-Tate more strongly in the data base market for the long term. "Dbase III has taken it in the chops recently, particularly when compared with products like R:Base, which are more user-friendly in the network environment," said Alan Loebel, a staff consultant with Harris Corp. in Melbourne, Fla. "But I think [SQL Server] is going to give them a leg up."

While the product will cost less than a minicomputer DBMS, it will be more expensive than stand-alone PC software. Users will have to shell out $1,500 to $3,000 for SQL Server but will also face other expenses, such as a network server with sufficient memory to run OS/2, OS/2-based networking software, front-end software, operating systems for all of the nodes on the network, applications for those nodes and an administrator for the data base system.

Robert Therrien, an analyst with Paine Webber, Inc., said he supports the move for an industry standard that allows users to focus on front-end data base applications and pay less attention to the SQL engine.

While many observers have read only negative signs for Ashton-Tate from the three-way deal, Therrien said the arrangement gives an endorsement to Ashton-Tate's technological smarts. "It shows that Microsoft has at least passively seen Ashton-Tate's internal SQL and that they like it," he said.

Rapidfile updated for productivity

BY ALAN J. RYAN
CW STAFF

TORRANCE, Calif. — Ashton-Tate Corp. last week upgraded its Rapidfile personal productivity data base program and cut the price by $100, saying the move will plant the product more firmly in the smaller business marketplace where it has gained acceptance.

Enhancements included in Version 1.2, which is available immediately, include an 80,000-word spelling checker and a Merriam-Webster, Inc. thesaurus, two features users have said they want, according to Michael Arrigo, product manager for Rapidfile.

Arrigo said Version 1.2's lower pricing would help differentiate it from Dbase III Plus. "Our initial intent was to position Rapidfile as a superior product among personal productivity data bases," he said, "but we pushed the envelope on what the break point was between what people want to pay for a relational data base and a file-management data base."

According to Ashton-Tate research, 90% of the Rapidfile sales are to organizations with less than 500 people, Arrigo said.

The product manager declined comment on when an OS/2-specific version of Rapidfile would be available, but said Version 1.2 will run in the compatibility box of OS/2. It does not, however, support the expanded memory features in OS/2 protected mode. OS/2 is the proprietary operating system that was developed by Microsoft Corp. and IBM.

Registered users can upgrade to the $295 Version 1.2 for $35, the company said. The software is available on either 5¼- or 3½-in. media. For those who have purchased the product since Nov. 15, the upgrade is free.

IDMS/R tool hooks into DB2

Well-heeled start-up company devises reverse-engineering system

BY CHARLES BABCOCK
CW STAFF

CAMBRIDGE, Mass. — A well-heeled start-up is offering a development system that can provide expert assistance in putting together IDMS/R applications and also reverse-engineer existing IDMS/R applications into DB2 applications.

If Bachman Information Systems, Inc. is able to fulfill its research and development plans, it will also offer next year a system that takes widely used IMS applications and reengineers them into IDMS/R or DB2 systems.

The latter goal is a more ambitious one, the Gartner Group, Inc., a Stamford, Conn.-based market research firm, has pointed out, because IMS has no underlying data dictionary or catalogue, as IDMS/R and DB2 do. But whatever the obstacles, Bachman has set the goal for itself, in the words of one observer, of not only turning a pig into sausage, but giving sausage new life by reincarnating it as a pig.

A Gartner Group report on the 5-year-old firm described its officers as "a venture capitalist's dream team." It is headed by company President Charles W. Bachman, originator of the Bachman Diagramming Technique, and Arnold A. Kraft, executive vice-president and former project leader of the Digital Equipment Corp.'s order-configuration expert system, Xcon.

The lineup

Additionally, the firm employs Sheldon A. Borkin, former researcher at the IBM Cambridge Scientic Center, as chief scientist, and Steven D. Lipsey, who formed the software products subsidiary at Bolt Beranek and Newman, Inc. as vice-president of sales. The firm has 65 employees and $12 million in venture capital financing, according to the Gartner Group.

The $25,000 Bachman Reengineering Product Set is written in Common LISP and is designed to run on an Intel Corp. 80386-based Compaq Computer Corp. 386, IBM Personal System/2 Model 80 or AT&T 386, under Microsoft Corp. MS-DOS 3.1 or higher with 10M bytes of hard disk storage.

The product set runs above the 640K memory limit of MS-DOS via a Bachman/Workstation Manager operating environment that is included in the set. It uses a mouse and pull-down menus. Complex data base diagrams can be enlarged on the screen for detail work, a demonstration revealed.

The Data Base Administrator component captures data description and data manipulation language in an existing IDMS/R application and stores it in a design data base. The information can be automatically translated into Bachman diagrams.

A data base designer can then modify the design at the logical level of the diagrams, with any additions to the application automatically transferred back into data description language. The design data base also captured the source code of the application. Through rule-based artificial intelligence techniques, the application can be reassembled with procedures, data description and data manipulation language and transferred to a mainframe for recompilation, company officials said.

In reengineering a system, the rules-based assistance highlights inconsistencies and duplicate data structures. "It makes the user into a person dealing with the exceptions, an editor rather than an author," Bachman said.

No established diagraming technique exists for DB2 data bases, so Chris Loosely — a Bachman employee with 16 years' experience at the IBM Santa Teresa laboratory — invented a diagraming method to be used with the product, Bachman said.

Mobility

The IDMS/R and DB2 components are slated for delivery in the second quarter.

"The ability to take an IDMS/R data base, move it to the logical level and then forward into DB2 is quite interesting to us," said J. Michael Barefield, manager of data administration at McDermott, Inc. McDermott is a beta-test site for the set.

As a beta-test user, Barefield found a bug in a sidebar on a screen that would not permit the user to scroll through it. He said the initial version of the software was shipped to him with a free 2M-byte memory board because the system's needs exceeded the projected 10M-byte limitation of his Compaq 386.

Vendors call AT&T on Sun deal

BY ROSEMARY HAMILTON
CW STAFF

MORRISTOWN, N.J. — AT&T last week agreed to meet with a group of computer suppliers that have protested the company's move to acquire 20% of Sun Microsystems, Inc.

The protesters include Digital Equipment Corp., Apollo Computer, Inc., Hewlett-Packard Co. and other vendors that sell Unix systems. Earlier this month, the group claimed that AT&T's alliance with Sun could hurt them competitively if the two companies were to develop a new Unix without including them.

The meeting is scheduled for sometime this week, an AT&T spokeswoman said.

"We have received correspondence from some very important customers, and because they are our customers, of course we will meet with them," said Vittorio Cassoni, president of AT&T's Data Systems Group.

Cassoni was responding to a letter sent by a dozen companies Jan. 15.

"I think they have legitimate concerns," said Kate Comiskey, head of the Unix research group at International Data Corp. in Framingham, Mass.

Sun and AT&T have been working on a Unix implementation that would include the features of both the University of California at Berkeley's Unix 4.2 and AT&T's Unix System V.

Concurrent extends line

BY ALAN ALPER
CW STAFF

TINTON FALLS, N.J. — Concurrent Computer Corp. last week extended its 3280 family of superminicomputers downward with a uniprocessor model offering performance the company rated at approximately 6.4 million instructions per second (MIPS).

Called the 3280SP, the uniprocessor carries an entry-level price of $200,000. It is aimed at users in the financial, government and technical markets who have time-critical applications but cannot afford current high-performance minicomputers, Concurrent said. In addition, the uniprocessor should appeal to customers who have space limitations, since it comes in a single 71-in.-high cabinet.

"We see this system opening new doors for us, particularly with customers who couldn't afford our 3280MPS multiprocessors," noted Rusty DeSantis, Concurrent's product manager of high-performance systems.

"It's also attractive for customers whose buildings were not built for large-scale computers, since it does not need raised floors or continuous air-conditioning," he added.

Concurrent said the 3280SP costs $31,172 per MIPS, compared with competing systems that range from $40,000 to $80,000 per MIPS.

The 3280SP is initially being offered in three basic configurations — 4M-, 8M- and 16M-byte versions — with prices ranging from $199,500 to $234,500. The system supports up to 72 users and is available 90 days after receipt of order, DeSantis said.

Full-featured

The 3280SP features a 32-bit pipelined processor with 16K bytes of cache memory, a 64-bit integrated floating-point processor and 8K- by 80-bit writable control store to accelerate time-critical functions, the company said. It can address up to 32M bytes of memory and features memory interleaving for concurrent access.

All components in the system attach to a 64M byte/sec. memory bus, the firm said. The system offers a 10M byte/sec. direct memory interface expandable to two connections with an aggregate of 20M byte/sec.

The base system comes with a single 368M-byte hard disk, although slots for three additional drives can be filled, providing for an aggregate capacity of 1G byte. Additional cabinets can be added for a maximum of 60G bytes of on-line storage, the company said.

Second-class postage paid at Framingham, Mass., and additional mailing offices.
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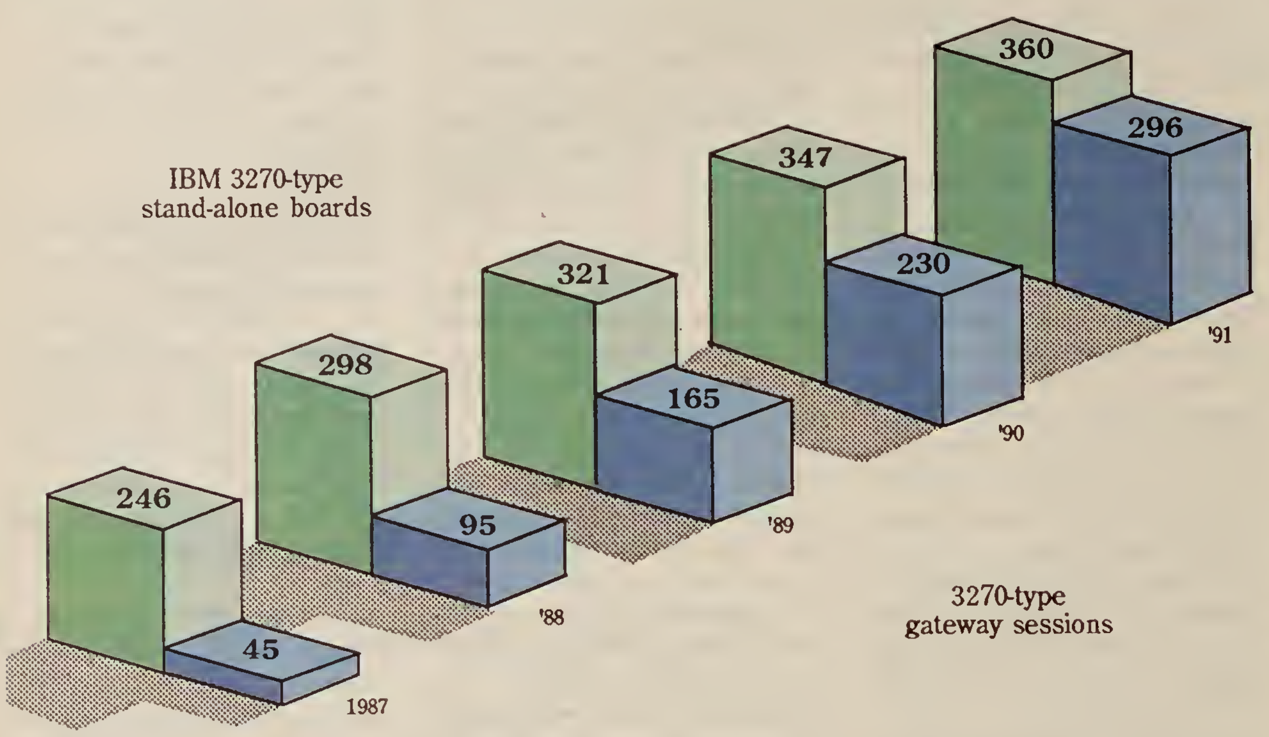
TRENDS

Terminal emulation

More firms look to net gateways for 3270 emulation

U.S. SHIPMENTS FORECAST FOR STAND-ALONE BOARD AND GATEWAY SESSION PRODUCTS (THOUSANDS OF UNITS)



Local-area network gateway unit shipments accounted for only 7% of the 1986 IBM 3270 terminal emulation market, but shipments should grow by 62% each year to account for approximately 45% of the market by 1991, according to a report from Framingham, Mass., research firm International Data Corp. (IDC). Stand-alone 3270 terminal emulation boards should only have a compound annual growth rate of 9%.

After strong stand-alone 3270 board shipments during the last few years, the gateway market is taking off because "people have installed their LANs, and the next thing they want to do is get LAN users access to a mainframe," IDC's Leslie Lord said. Users have also waited for effective tools to monitor, troubleshoot and ease gateway installation, she said.

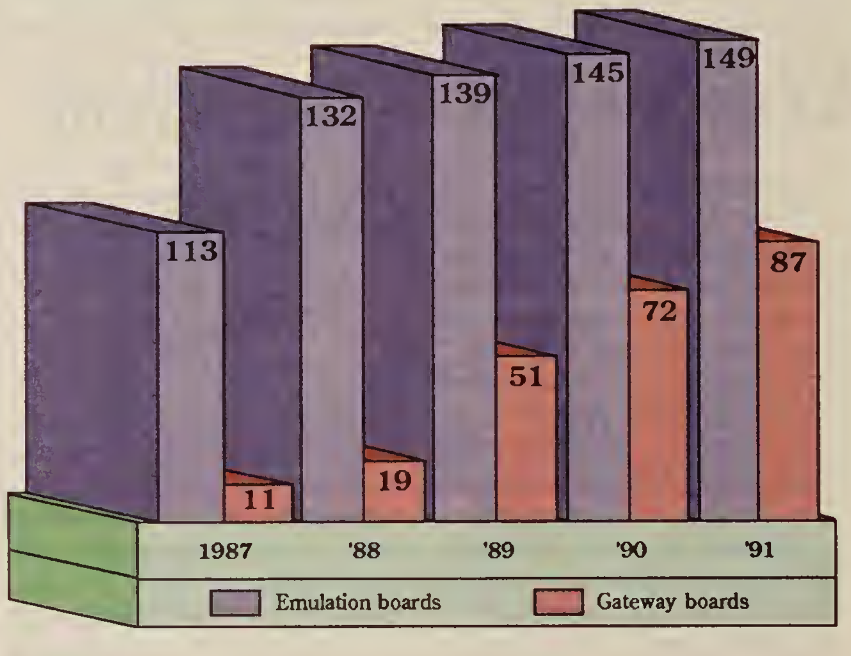
IBM's announcement of OS/2 Extended Edition for its Personal System/2 will pose both a threat and a great opportunity for gateway vendors, Lord said. "People like Digital Communications Associates, Inc. [DCA] and Novell, Inc. could come out with their own value-added version of Communications Manager," an OS/2 Extended component that incorporates both LU6.2 and 3270 connectivity, she said.

DCA held more than 50% of the stand-alone terminal emulation market in 1986, but IBM will chip away at DCA's dominance in the next few years, IDC predicted. The report was based on 1986 figures.

ELISABETH HORWITT

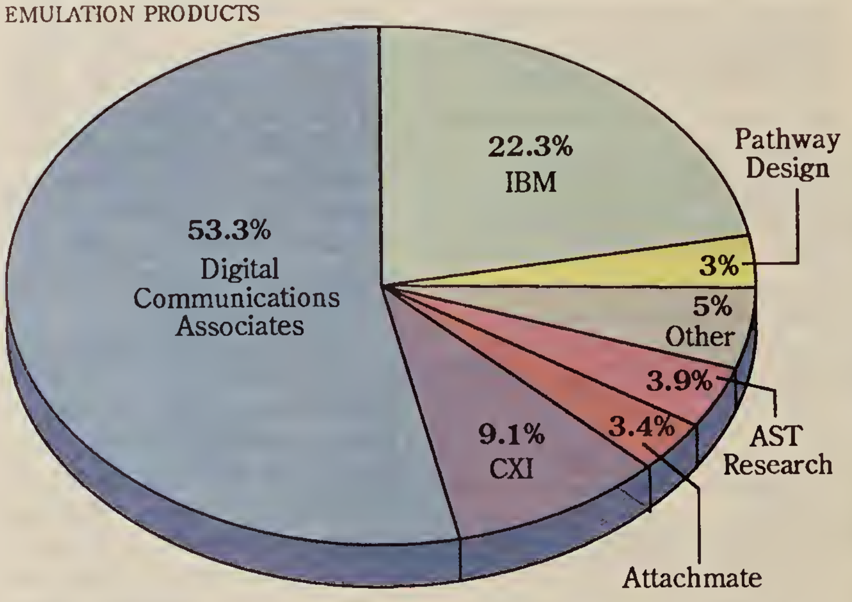
Same trend holds true in IBM minis

U.S. SHIPMENTS FORECAST FOR IBM SYSTEM/34, 36, 38 BOARDS (THOUSANDS OF UNITS)



Dominating 3270 emulation

1986 VENDOR MARKET SHARE OF IBM 3270 STAND-ALONE TERMINAL EMULATION PRODUCTS



INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHARTS: AMY J. SWANSON

INSIDE LINES

Heeerrre's Johnny, again. John Cullinane has ended one of the shorter retirements in corporate history. He's back on the board of directors of Cullinet Software. "He only missed one board meeting cycle," a company spokesman said. In October, Cullinane retired and handed over the chairman's title to David L. Chapman. According to sources inside the company, when the founder resurrected himself from consultant standing last month, he was welcomed back with open arms. Outside observers were less kind: "If he had been happy with what he saw at Cullinet from the outside, he wouldn't be back on the inside," one source said.

Break the bank. Systems woes continue to mount at Bankamerica. Last week, the company reported that it has set aside another $35 million for its Masternet trust reporting system. That fourth-quarter reserve is piled on top of $25 million previously held in reserve for a system that was originally projected to cost $20 million to build. A spokesman said the company is reevaluating its interest in the trust reporting business.

Hope you weren't holding your breath. After more than a year of delays and unfulfilled promises, Ashton-Tate will provide a sneak preview of its new Dbase to a select group of users and analysts this week, sources close to the company say.

The demonstrations could signal that Ashton-Tate is close to announcing a release date for the souped-up product, known by many as Dbase IV. That would be in line with Ashton-Tate Chairman Ed Esber's recent hints that an announcement is imminent, but with 350,000 lines of new source code to pull together for Dbase IV, observers are skeptical that the product will ship before summer.

Can the board be bought? Joseph Clark, the embattled Paterson, N.J., high school principal facing dismissal by the local board of education for indefinitely suspending problem students, was recently defended — and even offered a job — by President Reagan. Now Jack Berdy, founder and chairman of On-Line Software in nearby Fort Lee, N.J., wants to reward Clark for his tough stance. Berdy is ready to establish a $100,000 annual college tuition scholarship over the next 10 years for students at Clark's Eastside High School who wish to study computer science. There is one condition: Clark must remain as principal of the school.

Close-to-Miami vice. Analysts are receiving invitations from IBM to attend a briefing in Boca Raton, Fla., Feb. 11-12. Is this the precursor to another announcement? Some sources expect new IBM products next month covering the low end to the mid-range. Others report possible PS/2 price cuts, especially on the Model 50, which is slated to get a new disk drive.

In their domain. Apollo plans to introduce a new version of its Unix-based operating system Feb. 2. Domain/IX will be the first step in Apollo's rollout of a new generation of workstations. A high-end system based on a reduced instruction set computing processor that includes a new I/O and bus structure is another step that reportedly will be taken shortly.

Over the threshold. Memorex International finalized its acquisition of Telex last week after completing the necessary financing. Telex Chairman George Bragg was named president and chief operating officer of newly formed Memorex Telex North America. Sergio Mazza, who had headed Memorex's U.S. business, will lead a new division, Memorex Computer Supplies, in Milpitas, Calif.

Wait for the next FCC filing. What happened? Northwest Airlines' reservation system took an unscheduled midday rest Jan. 13, requiring passengers on at least one flight — from Orlando, Fla., to Memphis — to board without assigned seats. A Northwest ticket agent in Orlando said the whole system was down. A spokesman at the company's Minneapolis headquarters confirmed the system was down for an hour but would not report reasons or the extent of the outage. Northwest plans to merge the system with TWA's PARS system in March.

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"MSA is the undisputed leader of the software industry in the human resource arena," says Norris Overton, Amtrak's assistant vice president for Resource Management. "It evokes a tremendous confidence factor."

The MSA Payroll/Personnel System enabled Amtrak to eliminate multiple batch systems and replace them with one integrated, online, realtime system. Amtrak can now respond quickly and accurately to the more than 100 requests per week for ad hoc reports. And overtime in the human resource area has decreased considerably. According to Overton, "The accuracy and faster response time have been tremendous for the field, and we're confident that the MSA Payroll/Personnel System will meet our future needs."

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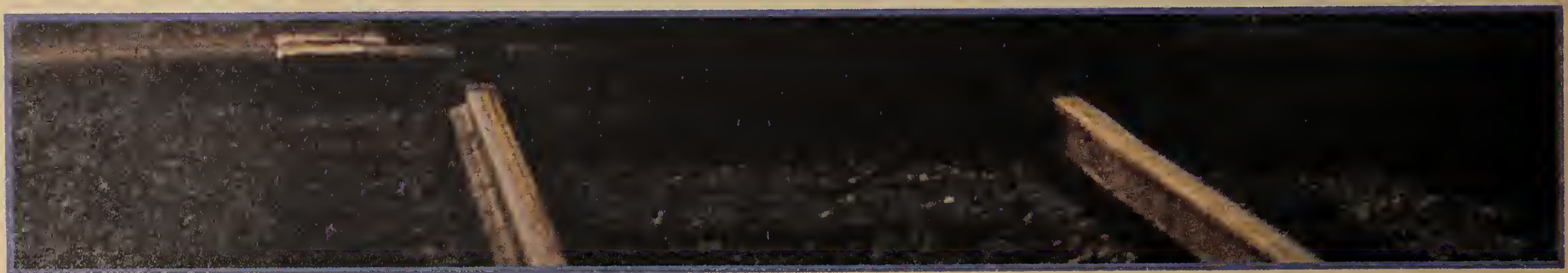

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